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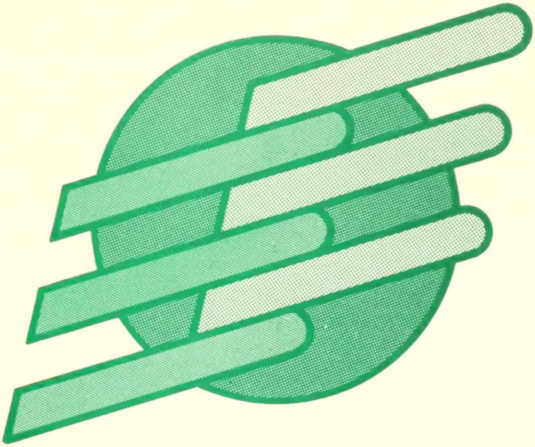

VOLUME 1

STONE & WEBSTER ENGINEERING CORPORATION

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PREPARATION OF THE ENVIRONMENTAL IMPACT REPORT

SECTION 1

DOCUMENTS RELATIVE TO THE PREPARATION OF THE ENVIRONMENTAL IMPACT REPORT

This section includes those documents which directly relate to the preparation of the Environmental Impact Report for the proposed conversion of Boston Edison Company's New Boston Station Units 1 and 2 from oil firing to coal firing.

The documents included are:

- The Environmental Notification Form which was filed by Boston Edison Company with the Massachusetts Executive Office of Environmental Affairs, and which describes the proposed coal conversion of New Boston Station Units 1 and 2.

- The Certificate of the Secretary of Environmental Affairs on Environmental Notification Form for New Boston Station Units 1 and 2 which outlines the scope of the Environmental Impact Report.

- February 8, 1983, letter from the Executive Office of Environmental Affairs discussing dredging and analysis of dredged material.

1.1 ENVIRONMENTAL NOTIFICATION FORM

The following section includes the Environmental Notification Form which was filed by Boston Edison Company with the Massachusetts Executive Office of Environmental Affairs, and which describes the proposed coal conversion of New Boston Station Units 1 and 2.

APPENDIX A
COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

ENVIRONMENTAL NOTIFICATION FORM

Do not write in this space

I. SUMMARY

A. Project Identification

1. Project Name: New Boston Station Units 1 & 2 Coal Conversion
2. Project Proponent: Boston Edison Company
   Address: 800 Boylston Street
   Boston, MA 02199

B. Project Description: (City/Town(s)) Boston, MA

1. Location within city/town or street address: 776 Summer Street
   Boston, MA
2. Est. Commencement Date: 4/1/84 Est. Completion Date: 6/1/88
   Approx. Cost $ 513 million (est.) Current Status of Project Design: 2 % Complete

C. Narrative Summary of Project

Describe project and give a description of the general project boundaries and the present use of the project area. (If necessary, use back of this page to complete summary).

Boston Edison Company is considering converting New Boston Station Units 1 and 2 to the use of coal. The units will retain the capability to burn oil. The units were designed to burn either coal or oil, but no coal handling equipment was ever constructed at the site.

The New Boston Station is on a site approximately 18 feet above mean low water bordering on the Reserved Channel. The site covers 24.2 acres.

The plant includes two 350 MW (net) oil-fired electric generating units and supportive fuel tanks. Unit 1 was constructed in 1965 and Unit 2 in 1967. In 1981 the plant burned approximately 5.4 million barrels of oil.

The Company is negotiating with the Massachusetts Bay Transportation Authority to acquire the use of the Authority's property adjacent to the plant. This property has previously been used as a power plant site.

Copies of this may be obtained from:
Name: L. N. Morgenstern Firm/Agency: Boston Edison Company
Address: 800 Boylston Street, P-254, Boston, MA 02199 Phone No. (617)424-2975

1979

THIS IS AN IMPORTANT NOTICE. COMMENT PERIOD IS LIMITED.
For Information, call (617) 727-5830

Use This Page to Complete Narrative, if necessary.

This project is one which is categorically included and therefore automatically requires preparation of an Environmental Impact Report : YES X NO ______

D. Scoping (Complete Sections II and III first, before completing this section.)

1. Check those areas which would be important to examine in the event that an EIR is required for this project. This information is important so that significant areas of concern can be identified as early as possible, in order to expedite analysis and review.

	Construction Impacts	Long Term Impacts		Construction Impacts	Long Term Impacts
Open Space & Recreation			Mineral Resources		
Historical			Energy Use		
Archaeological			Water Supply & Use		
Fisheries & Wildlife			Water Pollution	X	X
Vegetation, Trees			Air Pollution	X	X
Other Biological Systems			Noise	X	X
Inland Wetlands			Traffic	X	X
Coastal Wetlands or Beaches			Solid Waste	X	X
Flood Hazard Areas			Aesthetics		
Chemicals, Hazardous Substances,			Wind and Shadow		
High Risk Operations			Growth Impacts		
Geologically Unstable Areas			Community/Housing and the Built Environment		
Agricultural Land					
Other (Specify)					

2. List the alternatives which you would consider to be feasible in the event an EIR is required.

· Continue to burn #6 residual fuel oil.

E. Has this project been filed with EOEA before? Yes ____ No X
If Yes, EOEA No. ________ EOEA Action? ____________________

F. Does this project fall under the jurisdiction of NEPA? Yes X No ____
If Yes, which Federal Agency? U.S. Army Corps of Eng. NEPA Status? Undetermined

G. List the State or Federal agencies from which permits will be sought:

Agency Name	Type of Permit
U.S. Army Corps of Engineers	Work in navigable waters
U.S. Environmental Protection Agency	NPDES Permit Modification; Approval SIP Revision
Mass. CZM Office	Consistency Certification
Mass. DEQE	SIP Revision; Water Discharge Permit Modification; Waterways License; Asbestos Disposal; Plans Approval; Water Quality Certif.

H. Will an Order of Conditions be required under the provisions of the Wetlands Protection Act (Chap. 131, Section 40)?
Yes X No ____

DEQE File No., if applicable: ________

I. List the agencies from which the proponent will seek financial assistance for this project:

Agency Name	Funding Amount
Mass. Industrial Finance Agency (Pollution Control Bond Financing)	Uncertain

PROJECT DESCRIPTION

A. Include an original 8½ x 11 inch or larger section of the most recent U.S.G.S. 1:24,000 scale topographic map with the project area location and boundaries clearly shown. Include multiple maps if necessary for large projects. Include other maps, diagrams or aerial photos if the project cannot be clearly shown at U.S.G.S. scale. If available, attach a plan sketch of the proposed project.

B. State total area of project: 24.2 acres (additional land is being sought for coal storage)
Estimate the number of acres (to the nearest 1/10 acre) directly affected that are currently:

1. Developed .... 24.2 acres
2. Open Space/Woodlands/Recreation ____ acres
3. Wetlands .... ____ acres
4. Floodplain .... ____ acres
5. Coastal Area .... ____ acres
6. Productive Resources
   - Agriculture .... ____ acres
   - Forestry .... ____ acres
   - Mineral Products .... ____ acres

C. Provide the following dimensions, if applicable:
Length in miles N/A Number of Housing Units N/A Number of Stories N/A

	Existing	Immediate Increase Due to Project
Number of Parking Spaces		
Vehicle Trips to Project Site		
Estimated Vehicle Trips past project site		

D. If the proposed project will require any permit for access to local or state highways, please attach a sketch showing the location of the proposed driveway(s) in relation to the highway and to the general development plan; identifying all local and state highways abutting the development ; and indicating the number of lanes, pavement width, median strips and adjacent driveways on each abutting highway. and indicating the distance to the nearest intersection.

Access to highways exists and is not expected to be altered.

III. ASSESSMENT OF POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS

Instructions: Consider direct and indirect adverse impacts, including those arising from general construction and operations. For every answer explain why significant adverse impact is considered likely or unlikely to result.

Also, state the *source* of information or other basis for the answers supplied. If the source of the information, in part or in full, is not listed in the ENF, the preparing officer will be assumed to be the source of the information. Such environmental information should be acquired at least in part by field inspection.

A. Open Space and Recreation

1. Might the project affect the condition, use or access to any open space and/or recreation area?
Yes _____ No __X__

Explanation and Source:

No open space or recreation areas will be affected.

B. Historic Resources

1. Might any site or structure of historic significance be affected by the project? Yes _____ No __X__

Explanation and Source:

There are no known historic sites or structures on the site.

2. Might any archaeological site be affected by the project? Yes _____ No __X__

Explanation and Source:

There are no known archaeological sites on the project area.

C. Ecological Effects

1. Might the project significantly affect fisheries or wildlife, especially any rare or endangered species?
Yes _____ No __X__

Explanation and Source:

Emission and ambient standards will be met by the project and already developed industrial land will be constructed upon. No significant effects are therefore anticipated.

2. **Might the project significantly affect vegetation, especially any rare or endangered species of plant?**
Yes ______ **No** X____
(Estimate approximate number of mature trees to be removed: None **)**

Explanation and Source:

There is no important vegetation on the site.

3. **Might the project alter or affect flood hazard areas, inland or coastal wetlands (e.g., estuaries, marshes, sand dunes and beaches, ponds, streams, rivers, fish runs, or shellfish beds)? Yes** ______ **No** X____

Explanation and Source:

This project will not significantly alter or effect these areas.

4. **Might the project affect shoreline erosion or accretion at the project site, downstream or in nearby coastal areas? Yes** ______ **No** X____

Explanation and Source:

This project will not change the protected shoreline.

5. **Might the project involve other geologically unstable areas? Yes** ______ **No** X____

Explanation and Source:

Historical data indicate that the project area is geologically stable and no offsite effects are expected.

D. Hazardous Substances

1. **Might the project involve the use, transportation, storage, release, or disposal of potentially hazardous substances?**
Yes ______ **No** X*____

Explanation and Source:

*It is possible that minor amounts of solvents will be used during construction activities.

E. Resource Conservation and Use

1. Might the project affect or eliminate land suitable for agricultural or forestry production?
   Yes ______ No __X__
   (Describe any present agricultural land use and farm units affected.)

   Explanation and Source:

   The project area is an existing industrial site.

2. Might the project directly affect the potential use or extraction of mineral or energy resources (e.g., oil, coal, sand & gravel, ores)? Yes ______ No __X__

   Explanation and Source:

   The proponent is not aware of any such resources being available in the project area.

3. Might the operation of the project result in any increased consumption of energy? Yes ______ No __X__

   Explanation and Source:
   (If applicable, describe plans for conserving energy resources.)

   This project will produce no significant increase in energy consumption other than to permit the use of coal at the plant.

F. Water Quality and Quantity

1. Might the project result in significant changes in drainage patterns? Yes ______ No X______

   Explanation and Source:

   No significant changes are expected in drainage patterns.

2. Might the project result in the introduction of pollutants into any of the following:
   (a) Marine Waters .... Yes __X__ No ______
   (b) Surface Fresh Water Body .... Yes ______ No __X__
   (c) Ground Water .... Yes ______ No __X__

   Explain types and quantities of pollutants.

   Pollutants from coal pile runoff, wastewater treatment and ash disposal may be introduced; however, all discharges will be in compliance with effluent and ambient standards.

3. Will the project generate sanitary sewage? Yes X No ___

If Yes, Quantity: 300 (est.) gallons per day

Disposal by: (a) Onsite septic systems .... Yes ___ No X

(b) Public sewerage systems .... Yes X No ___

(c) Other means (describe) portable toilets during construction

Quantities will not increase except during construction activities.

4. Might the project result in an increase in paved or impervious surface over an aquifer recognized as an important present or future source of water supply? Yes ___ No X

Explanation and Source:

The groundwater at the site is saline.

5. Is the project in the watershed of any surface water body used as a drinking water supply?

Yes ___ No X

Are there any public or private drinking water wells within a 1/2-mile radius of the proposed project?

Yes ___ No X

Explanation and Source:

There are no water supply sources near the site.

6. Might the operation of the project result in any increased consumption of water? Yes X No ___

Approximate consumption ___ gallons per day. Likely water source(s) Reserved Channel

Explanation and Source:

The bottom ash system will from time-to-time require makeup to the system. Water sprays for dust control and equipment wastes will also be needed. Quantities will be determined during the engineering phase.

7. Does the project involve any dredging? Yes ___ No X*

If Yes, indicate:

Quantity of material to be dredged ___

Quality of material to be dredged ___

Proposed method of dredging ___

Proposed disposal sites ___

Proposed season of year for dredging ___

Explanation and Source:

*Although no dredging is planned for the project, there is the possibility that further analysis could show the necessity of some minor dredging at this site.

G. Air Quality

1. Might the project affect the air quality in the project area or the immediately adjacent area?
   Yes X No ____
   Describe type and source of any pollution emission from the project site.

   The Company is seeking a SIP revision for an increased emission rate for SO_2 and will also request permission to use coal above a 9% ash content. Plant emissions will be in conformity with applicable regulations and standards. The effect on air quality will be minimum because of plant design and control equipment.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any pollution emissions caused by the project, including construction dust? Yes X No ____

   Explanation and Source:

   Sensitive receptors of the types listed are located within 3 miles of the site. However, emissions will be in compliance with State and Federal laws and regulations.

3. Will access to the project area be primarily by automobile? Yes X No ____
   Describe any special provisions now planned for pedestrian access, carpooling, buses and other mass transit.

   There will be a temporary increase in traffic during construction.

H. Noise

1. Might the project result in the generation of noise? Yes X No ____

   Explanation and Source:
   (Include any source of noise during construction or operation, e.g., engine exhaust, pile driving, traffic.)

   Construction noise will include some pile driving. There will also be truck traffic and coal handling equipment noise as well as noise normally associated with the operation of a power plant.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any noise caused by the project? Yes X No ____

   Explanation and Source:

   There are residences in the general vicinity of the site. However, applicable laws and regulations will be complied with.

I. Solid Waste

1. **Might the project generate solid waste? Yes X No ______**

Explanation and Source:
(Estimate types and approximate amounts of waste materials generated, e.g., industrial, domestic, hospital, sewage sludge, construction debris from demolished structures.)

Some construction debris, the amount of which is undetermined at this time, will be generated on site on a temporary basis. Coal ash will be generated at the rate of 91,000 ton/yr for each of the two units, or approximately 15,000 ton/month for both units at a 70% annual average capacity factor. Approximately 80% of this ash will be fly ash and the remaining 20%, bottom ash.

J. Aesthetics

1. **Might the project cause a change in the visual character of the project area or its environs?**
Yes X No ______

Explanation and Source:

There will be some changes in station structures as well as the addition of coal storage and a new stack. Such changes are not believed by the proponent to be significant to the industrial character of the site.

2. **Are there any proposed structures which might be considered incompatible with existing adjacent structures in the vicinity in terms of size, physical proportion and scale, or significant differences in land use?**
Yes ______ No X

Explanation and Source:

All proposed structures will be compatible with the existing station.

3. **Might the project impair visual access to waterfront or other scenic areas? Yes ______ No X**

Explanation and Source:

This is an industrial area and there is currently little, if any, visual access to the waterfront or other scenic areas.

K. Wind and Shadow

1. **Might the project cause wind and shadow impacts on adjacent properties? Yes ______ No X**

Explanation and Source:

No significant impact is expected.

CONSISTENCY WITH PRESENT PLANNING

A. Describe any known conflicts or inconsistencies with current federal, state and local land use, transportation, open space, recreation and environmental plans and policies. Consult with local or regional planning authorities where appropriate.

There are no known conflicts or inconsistencies with any of the plans or policies noted above.

FINDINGS AND CERTIFICATION

A. The notice of intent to file this form has been/will be published in the following newspaper(s) :

(Name) Boston Globe (Date) 10/12/82
South Boston Tribune 10/14/82

B. This form has been circulated to all agencies and persons as required by Appendix B.

October 14, 1982
Date

C B Damrell
Signature of Responsible Officer or Project Proponent

C. B. Damrell, V.P.
Name (print or type)

Address Boston Edison Company
800 Boylston Street
Boston, MA 02199

Telephone Number 424-3186

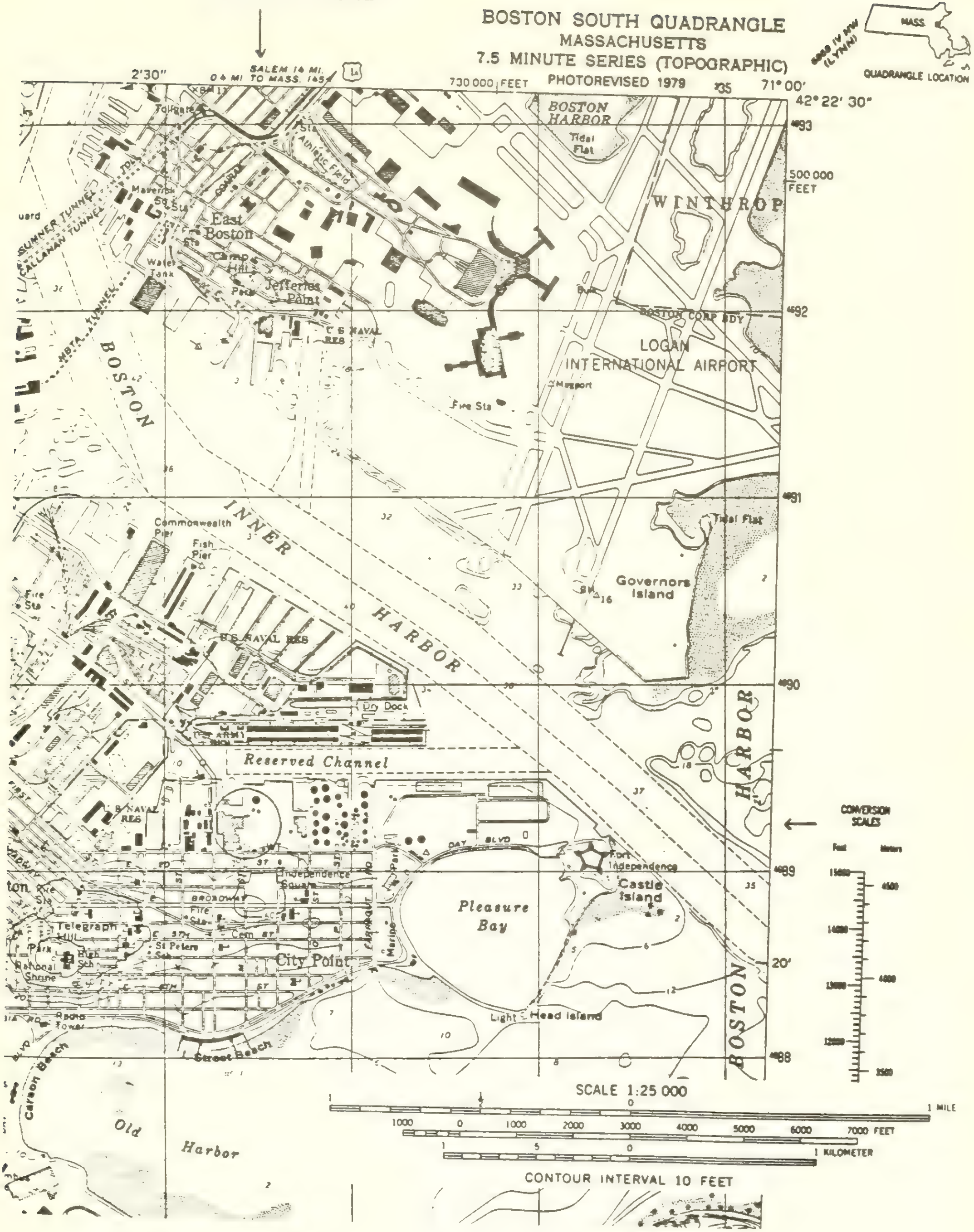
October 14, 1982
Date

L. N. Morgenstern
Signature of person preparing ENF (if different from above)

L. N. Morgenstern
Name (print or type)

Address Boston Edison Company
800 Boylston Street
Boston, MA 02199

Telephone Number 424-2975



Boston Edison Company
New Boston Station

1.2 ENVIRONMENTAL IMPACT REPORT SCOPE DOCUMENTS

The following section includes the Certificate of the Secretary of Environmental Affairs on Environmenal Notification Form for New Boston Station Units 1 and 2 which outlines the scope of the Environmental Impact Report, and a February 8, 1983 letter from the Executive Office of Environmental Affairs discussing dredging and analysis of dredged material.

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J KING
GOVERNOR
JOHN A BEWICK
SECRETARY

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

ON

ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME:	New Boston Station, Units 1 and 2
PROJECT LOCATION:	Boston
EOEA NUMBER:	4545
PROJECT PROPONENT:	Boston Edison
DATE NOTICED IN MONITOR:	October 22, 1982

Pursuant to M.G.L., Chapter 30, Section 62A and Sections 10.04(1) and 10.04(9) of the Regulations Governing the Implementation of the Massachusetts Environmental Policy Act, I hereby determine that the above referenced project does require the preparation of an Environmental Impact Report. The scope and alternatives for the EIR shall be as follows:

SCOPE

INTRODUCTION

The Executive Office of Environmental Affairs anticipates that the EIR will be a painstaking and thorough document, as befits the magnitude of the project and the dense urban environment in which it is located. The Scope which follows is in outline form; minimally, the level of discussion contained in previous coal conversion EIRs this office has reviewed must be provided for all topics. Special care should be taken to respond to questions and comments raised during the public scoping meetings.

Take note that an EIR must not only demonstrate that existing regulatory criteria can be met, but must show how those criteria will be met. Moreover, the document must go further than this. State agencies have an obligation, under G.L. c. 30 sec. 61, to utilize every feasible means and measures to avoid or minimize impact on the environment. The EIR must provide the agencies with enough information to permit them to carry out this obligation.

Portions of the outline scope below are expanded by discussion of points to be treated. Such discussion is not a limitation; it is the proponent's responsibility to submit an EIR which responds fully to all subjects outlined. However, the specific issues discussed, which have been raised during the scoping process, in review of other coal conversions, and in office analysis, are explicitly required to be addressed in the DEIR.

I. Documents Relative to Preparation of EIR

A. ENF
B. Scope

II. Project Summary

A. Name and address of proponent
B. Location of facility
C. Brief description and history of project
D. Summary of environmental impacts
E. Cost-benefit summary
F. Summary of conclusions

III. Discussion of All Statutory and Regulatory Requirements

A. Federal

Discuss PSD program, and outline its applicability in Boston metropolitan airshed. Clarify whether baseline has been triggered. Discuss consumption of increment. Discuss history and technology requirements of New Source Performance Standards. Discuss plants built in conformity with NSPS; compare them with plants to which NSPS are not applicable. Discuss criteria for applicability of NSPS; apply them to this project. Attempt to obtain an EPA ruling on whether this plant is exempt under statutory criteria.

Indicate how the height of the stack was chosen and its relationship to Logan Airport, FAA rules, etc.

B. State

Describe the SIP and review its history as related to coal conversions.

The proponent should discuss in detail regulation 310 CMR 7.05(1)(d) which controls the sulfur content of fuels in the Metropolitan Air Pollution Control District as it relates to the increase in sulfur emissions at New Boston Station. It is expected that DEQE will comment at length on the discussion when it appears in the DEIR. One comment has argued that the changes in DEQE policy and regulation needed to permit this proposed project are so great as to require separate and independent environmental review of DEQE actions. This question will be further considered upon review of the Draft EIR and DEQE comments thereon.

Discuss PSD and increment consumption and its possible effects on future development in the Boston area; also non-attainment review.

Discuss how DPU regulation impacts on the project, including the time-frame for securing funds and constraints on Boston Edison or on state agency permits.

Discuss the status of the purchase of land from MBTA and alternatives.

Discuss in detail GEP stack height, including criteria, calculations, history and rationale.

C. Local

IV. Description of Existing Facility and Environs

A. Describe the site of facility.
B. Description of environs
   1. Topography
   2. Land and water uses
C. Identify all sensitive receptors. Map population density radially distant from the plant (500-foot rings).
D. Identify features of historical or archaeological interest.
E. Describe the scenic and cultural quality of the area.
F. Describe the current plant layout.
G. Describe how fuel is brought to the plant.
H. Describe the power generating system. and routine operational procedures.
I. Describe the cooling system.
J. Describe any pollution control equipment currently in use.
K. Identify and quantify all current plant waste products and describe their removal.
L. Provide a map and description of Boston Edison's service area.
M. Discuss the relationship between the facility, the N.E. Power Grid and Boston Edison's other facilities. This section should inform the reader about how the facility normally operates on a daily, weekly and seasonal basis.

V. Description of the Existing Environment

A. Meteorology

Data should be presented on at least a quarterly basis, reflecting the seasons (December-February, March-May, June-August, September-November). Wind persistence data should be provided as well as wind direction. Any peculiarities due to the presence of the ocean should be discussed (i.e., a discussion of diurnal variations in wind speed and direction) in some detail.

B. Climatology

Particular attention should be paid to the manner in which weather systems pass through the area and out to sea, or how it affects Maine and the Maritime Provinces of Canada.

C. Air Quality

A detailed discussion of the present status and long-range trends of air quality, including:

1. Criteria pollutants (including RPM, CO hotspots and NO_x hotspots)

   a. History

   Present a history of criteria pollutant levels in the metropolitan airshed. Discuss effect of major changes (e.g., estimate effect on South Boston air quality of closure of MBTA power plant). Identify exceedances.

   b. Present emissions from plant.

   Data should be presented on a monthly and an annual basis. Correlate with data presented under a. History.

   c. Anticipated future trends in air quality

2. Non-criteria pollutants

A major effort should be made to gather data and prepare estimated of past and present conditions. Samples indicative of past conditions should be sought and their constituents determined. The goal is to estimate historical environmental conditions in South Boston in the absence of contemporaneous monitoring data, for sulfates, trace metals and radionuclides.

   a. Sulfates
   b. Trace metals
   c. Radionuclides
   d. Present emissions from facility
   e. Any trends in air quality

D. Surface Water Quality and Hydrology

E. Ground Water Quality and Hydrology

F. Terrestrial and Aquatic Ecology

G. Noise

   1. Background
   2. Plant

VI. Description of Proposed Project

A. Objects and characteristics of the project
B. Stack
C. Electrostatic precipitators

Indicate what level they are designed for, reliability, effects and likelihood of failure, excess capacity, etc. Discuss energy usage, as a percentage of plant output.

D. Fly ash handling system
E. Boiler modifications
F. Bottom ash handling system
G. Coal handling (unloading, moving, storage, pulverizing and firing)
H. Solid waste management
I. Wastewater handling, treatment and disposal
J. Cost benefits description and calculations. Include solid waste disposal.
K. Timetable

Clearly show sequence and timing of events and effects on function and workforce.

L. Visual renderings.

Should show what the facility will look like when the project is complete.

VII. Impacts of Project on Environment.

The DEIR should reflect not only the coal conversion at New Boston, but the cumulative impacts of all the proposed development in the South Boston area as well. This development includes (1) garment industry (EDIC-sponsored) move from Chinatown (2) Commonwealth Pier 5 development, (3) fan piers 1, 2 and 3 (condominimums, light industry, hotel, commercial), (4) Seaport development project, (5) Northern Avenue bridge construction, (6) South Station construction and modification and (7) Dewey Square development. In particular, the EIR should address the total traffic impacts (constructional and operational) of all the proposed projects.

A. Air quality impacts

1. Construction phase

a. Noise

i. Demolition
ii. Traffic
iii. Establishing reserve coal pile
iiii. Working at night

b. Dust

i. Demolition
ii. Asbestos
iii. Traffic
iiii. Establishing reserve coal pile

c. Volatile organic compounds

2. Operational phase

a. Emissions from proposed facility

i. Criteria pollutants

This section should deal with all criteria pollutants, including respirable particulate matter, carbon monoxide and nitrogen oxide hotspots and ozone. Nonmethane organic compounds which are precursors to ozone should be estimated using most recent EPA emission factors.

The respirable particulate matter section should discuss and attempt to resolve the disagreement in the literature over whether the precipitators operate with a lesser efficiency for sub-2.5 micron particulates.

ii. Non-criteria pollutants

o. Sulfates - This section should deal with both background sulfate levels and impacts from New Boston and other fossil fuel utilizing facilities. Discuss whether sulfate emissions play a localized role in the creation of acid rain.

oo. Trace metals - A comprehensive evaluation of the levels and impacts of trace metals from New Boston should be made.

ooo. Radionuclides - This section should include a comprehensive evaluation of the radionuclides contained in the fly and bottom ash, the coal pile and coming out the stack.

oooo. Organics - A complete assessment of types and amounts of organic compounds should be made. Both stack emissions and coal pile emissions should be considered.

iii. Dispersion modeling

This section should identify all major sources within the area of significant impact, giving relevant stack parameters of each. The dispersion models used should be thoroughly discussed, giving the strength and weaknesses of all models used.

Meteorological conditions which inhibit dispersion should be identified and discussed.

o. Selection of model(s)
oo. Stack parameters
ooo. Meteorology (including mixing heights)

b. Impact analysis

Give a clear discussion of how background values were determined.

i. NAAQS
ii. PSD increment analysis

c. Noise

i. Plant
ii. Traffic
iii. Coal pulverizing
iiii. Coal unloading and handling

d. Acid precipitation

Discuss impacts using most up-to-date information

i. Local
ii. Regional
iii. National/international (e.g., Canada)

B. Water impacts

1. Construction phase

a. Water quality and hydrology
b. Waterfront impacts
c. Dredging in Reserved Channel

2. Operational phase

a. Surface water quality and hydrology
b. Ground water quality and hydrology
c. Aquatic ecological impacts
d. Recreational boating and fishing
e. Waterfront impacts
f. Coal pile runoff
g. Wastewater

C. Land impacts

1. Construction phase

a. Traffic
b. Parking

2. Operational phase

a. Terrestrial ecological impacts
b. Coal pile impacts
c. Land use
d. Waterfront

D. Socioeconomic impacts

1. Property values

2. Economic development of South Boston

How the facility fits in with the other projects noted in Section XI. as well as the overall situation in South Boston should be discussed.

E. Aesthetic impacts

VIII. Solid Waste Disposal

A. Construction phase

1. Demolition material

2. Dredging spoil

B. Operational phase

The disposal of solid waste becomes a growing problem with each coal conversion. The proponent should consider this an important topic and deal with it in detail.

1. Ash disposal

    a. short-term management
    b. long-term management

2. Alternative disposal methods
3. Long-term disposal commitments

IX. Alternatives to Proposed Project

The following alternatives should be discussed, taking into account all costs and benefits.

A. No change
B. New stack plus 2.2% sulfur oil
C. Proposed project using

1. 1% sulfur coal
2. .7% sulfur coal
3. also lower ash coal

Discuss availability of each.

D. Use of natural gas
E. Other or additional advanced pollution control device or technique

1. Scrubbers (wet and dry) and partial scrubbing
2. Baghouse
3. Fluidized bed
4. Limestone injection
5. Special control for soot blowing
    a. Baghouse
    b. Multiclone

F. Buy more electricity
G. Phase out New Boston Station
H. Build new suburban or rural facility (costs and implications to be discussed; no specific sites to be studied)

X. Health Effects of Alternatives

After consultation with the Massachusetts Department of Public Health and the South Boston Community Health Center, the proponent shall evaluate the impact on public health of each of the alternatives set forth in Section IX, below.

XI. Measures Which Will be Used to Minimize Environmental Impacts

A. Construction

1. Noise control (demolition, equipment, etc.)
2. Traffic and parking
3. Dust suppression (demolition, coal handling)

B. Operational

1. Coal handling and coal pile management

   a. Noise control)
   b. Dust suppression) in all phases of coal and ash handling
   c. Avoiding fires
   d. Operating with small or no reserve pile

2. Pre-stack emission reduction

   a. Coal washing
   b. Limestone injection with coal

3. Stack emissions

   a. flue gas treatment
   b. equipment failure or malfunction

4. On-site fly and bottom ash handling and storage
5. Wastewater treatment and handling
6. Aesthetics
7. Solid waste transportation and disposal
8. Fugitive emissions

XII. The proponent should discuss existing air quality monitoring programs in the area affected by the facility, discussing the parameters which are measured, the method and frequency of measurement, the disposition of the data and the uses to which the information is put. Discuss what significant emissions of the project will be monitored. Evaluate whether data on emissions not currently measured could be obtained as part of current monitoring programs (e.g., trace metal emissions), and whether any monitoring programs for other pollutants should be instituted as part of the proposed project.

XIII. Appendices

A. Existing Environmental Problems

This section of the EIR should discuss past and present baseline environmental problems (especially air quality and noise) attributed to the existing facility. It shall describe the problems experienced by the community and explain their causes (distinguishing between design, operational, maintenance/breakdown, management and meteorological causes). It shall discuss to which extent such problems have been solved, are being worked on, or are unavoidable It shall further discuss means of working with the community to give community input into the identification and solution of existing or future problems, and shall describe management procedures which will ensure that problems are recognized and dealt with, and complaints do not go unresponded to.

Because of the level of community concern over past and current problems, and the demonstrated capacity of that concern to influence and even overwhelm analysis of future proposals, the proponent may respond to this section of the scope in a separate report, circulated in the community and filed with this office at least 30 days prior to the filing of the Draft EIR. In such event, the Draft EIR need only contain a detailed summary of the separate report and discuss the comments received on it.

B. Comments and Correspondence

C. Technical Support for SIP Revision

D. Technical Support for other Impact Analyses (e.g., traffic)

If desired, Appendices C and D may be printed in a separate volume, of more limited distribution than the EIR (but nonetheless available on request).

December 27, 1982
DATE

Samuel G. Mygatt, for
JOHN A. BEWICK, SECRETARY

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

MICHAEL S. DUKAKIS
GOVERNOR

JAMES S. HOYTE
SECRETARY

February 8, 1983

Mr. F. M. Lee
Environmental Affairs Division
Boston Edison Company
800 Boylston Street
Boston, MA 02199

Re: New Boston Station Conversion
EOEA #4545

Dear Mr. Lee,

We have received and reviewed your letter dated January 25, 1983, which indicates a need to dredge approximately 5,000 cubic yards of sediment from the Reserved Channel to bring the channel depth to 35 feet and thereby accommodate the berthing of vessels to bring coal to New Boston Station, in the event that it is converted.

The issue of dredging and analysis, handling and disposal of dredged material must be addressed in the Draft EIR which Boston Edison is currently preparing to support its request to burn coal.

I am enclosing copies of Part I and Part II of the Application for Certification for Dredging, Dredge Material Disposal and Filling Projects.

Information required on pages 51, 52, 53, 54 and 56 of Part I should be addressed in the DEIR.

Boston Edison Co. should consult with DEQE-Division of Water Pollution Control to develop a protocol for the sampling and analysis of dredged material in the Reserved Channel to fulfill the requirements of both Part I and Part II. Said protocol should be submitted to EOEA-MEPA Unit as a supplement to the ENF and be included, along with results and discussion, in the DEIR.

If you have any further questions, do not hesitate to call this office.

Sincerely,

John H Matteson

John H. Matteson
Associate Environmentalist

JHM/elk
Enclosures

RECEIVED
FEB 14 1983
F. M. LEE

MASSACHUSETTS DIVISION OF WATER POLLUTION CONTROL

Application for Certification for Dredging, Dredge Material Disposal and Filling Projects.

Part I - Standard Application

1) Name and Address of Applicant: ______________________________

____

____

Telephone Number: ______________________________

2) Name and Address of Authorized Agent, if any: ____________________

____

____

Telephone Number: ______________________________

3) Description of Proposed Dredging Site:

A) Describe in detail the proposed project or activity, including the location, the purpose and intended use of the project, identification of the waters of the Commonwealth affected by the project, and the water quality classification applicable to those waters.

____

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____

Date Activity to commence ________ Date Activity to be completed ________

B) Attach a plan(s) of the proposed project drawn as follows:

Vicinity Map. Identify the map or chart from which the vicinity map was taken and show the following:

____ Location of the activity site including latitude and longitude and river mile, if known.

____ Name of waterway.

____ All applicable political (county, borough, town, city, etc.) boundary lines.

____ Name of and distance to local town, community, or other identifying location.

____ Names of all roads in the vicinity of the site.

____ Graphic scale.

____ North arrow.

Plan View. The plan view of the proposed activity should show the following:

____ Existing shorelines.

____ Ebb and flood in tidal waters and direction of flow in rivers.

____ North arrow.

____ Graphic or numerical scale.

____ Mean high and low water lines if the proposed activity is located in tidal areas.

____ Ordinary high water line and ordinary low water line if the proposed activity is on a lake or ordinary high water if on a stream.

____ Water depths around the project.

____ Principal dimensions of the structure or work and extent of encroachment beyond the applicable high water line.

____ Waterward dimension from an existing permanent fixed structure or object.

____ Distance between proposed activity and navigation channel, where applicable.

____ Harbor lines, if established and if known.

____ Location of structures, if any, in navigable waters immediately adjacent to the proposed activity.

____ Location of any wetlands, swamps, marshes, etc. Identify.

____ Proximity to any designated areas of critical environmental concern/Areas for Preservation or Restoration (ACEC/APR) (See CZM regulations)

Elevation and/or Section View. The elevation and/or section view of the proposed project should show the following:

____ Same water elevations as in the plan view.

____ Depth at waterward face of proposed work. Show dredging grade.

____ Graphic or numerical scale.

____ Cross-section of excavation including approximate side slopes.

C) Physical Description

1. What is the length, width, depth and volume of the proposed project? Length ______________yds, Width ____________yds, Depth ___________yds, Volume ___________cu. yds.

2. Is the proposed project considered (a) a new project or (b) maintenance of an existing project?

3. Describe in complete detail the physical dredging operation including descriptions of the type of dredge equipment, i.e., hopper dredge, hydraulic dredge, etc., the type of transportation to be used from the dredge site to the disposal site, the method of release of the dredged material into the disposal site, and the name of the contractor if other than the applicant.

D) Historical Parameters

1. To the best of your knowledge, does the proposed project area have any past history of:

   a) chemical or oil spills or discharge? Yes ___ No ___

   b) upstream or on-site industrial or municipal discharge Yes ___ No ___

   c) chronic pollutant loading from port or harbor use and/or other indirect sources of pollutants? Yes ___ No ___.

To expedite processing for any affirmative answer, provide as much historical information as you have, including dates, amounts, concentrations, etc., of such spills or discharge.

2. What is the expected frequency of maintenance dredging of this project? Explain.

5) Description of the Disposal Site for Dredged Material.

A) Location of proposed disposal site and its physical boundaries.

B) Has the site been designated by the state or E.P.A. as a dredge disposal site? Yes ___ No ___

If yes, supply any available documentation as to effects of other authorized dumpings that have been made in the dumping area (e.g., heavy metal background reading and organic carbon content).

If no, give a description of the characteristics of the proposed disposal site and an explanation as to why no previously designated site is feasible.

C) Is anticipated disposal site located within a designated ocean sanctuary as established by federal law or G. L. c. 132A, § 13? Yes ___ No ___ If yes, which sanctuary?

D) If disposal is anticipated to occur on land, indicate drainage characteristics from the results of test pits, borings and percolation tests as applicable.

E) How long is disposal site estimated to be in use? Indicate the duration of this disposal action and anticipated future use of site.

F) Include plans of proposed site as described in Item 3(b) above, unless ocean site is proposed. If land disposal is proposed, include plans for effluent control at the disposal site.

SECTION 2

PROJECT SUMMARY

2.1 PROJECT IDENTIFICATION

Proponent

Boston Edison Company
800 Boylston Street
Boston, Massachusetts 02199

Project Location

New Boston Station
776 Summer Street
South Boston, Massachusetts 02127
Latitude: 42 degrees, 20 minutes, 21 seconds
Longitude: 71 degrees, 2 minutes, 6 seconds

Project Identification

Executive Office of Environmental Affairs (EOEA)
File No. 4545

2.2 PROJECT DESCRIPTION AND HISTORY

Boston Edison Company (BECO) owns and operates New Boston Station, located at 776 Summer Street, South Boston, Massachusetts. The station presently consists of two operating electric generating units, currently oil fired, with a combined maximum net power rating of 760 MW. The site has been used for coal- and oil-fired power production since the turn of the century. New Boston Station Units 1 and 2 went into commercial operation in the years 1965 and 1967, respectively. The site includes the retired L Street Station power and steam facilities, the last of which was deactivated in 1981. A detailed description of the existing New Boston Station facilities is provided in Section 4.7.

New Boston Station Units 1 and 2 have a maximum net generating capacity of 760 MW. The boiler for each unit was designed to accommodate the future burning of pulverized coal. Space was allocated for all necessary pulverized-coal-firing equipment, however, the equipment was not installed. Units 1 and 2 currently burn No. 6 residual fuel oil with a 1 percent sulfur content. The annual station capacity factors for 1980 to 1982 range from 60 to 74 percent.

The proposed project involves the conversion of New Boston Station Units 1 and 2 to coal combustion while retaining the ability to burn oil. The anticipated annual station capacity factor after conversion is 70 percent.

Construction and demolition activities for the proposed conversion project would commence in January 1985. Units 1 and 2 will incur outages of 8 months each. These outages will not occur simultaneously. Start-ups of the converted Units 1 and 2 are scheduled for October 1987 and June 1988, respectively. The project includes the following major activities, which are discussed in greater detail in Section 6.2:

- Demolition of existing structures in certain areas to accommodate new precipitators, induced draft fans, chimney, and waterfront facilities for coal vessel receiving.

- Dredging and disposal of approximately 25,000 cubic yards of dredged materials to accommodate the berthing of a coal delivery vessel.

- Construction of waterfront coal handling facilities, including mooring and breasting dolphins to secure the coal delivery vessel, interconnecting walkways, waterfront conveyors, a coal surge bin building and support platform, a waterfront transfer house, and associated mechanical equipment for coal handling.

- Construction of active coal storage silos and stockout and reclaim conveyors, coal crusher and transfer houses, coal conveyor galleries, and new in-plant coal storage bunkers.
- Construction of a lined reserve coal pile and associated reclaim hoppers, stockout and reclaim conveyors, fire protection and dust suppression equipment, and a lined coal pile runoff collection system.
- Installation of new coal feeders, pulverizers, and combustion system equipment for the existing Units 1 and 2 boilers.
- Construction of electrostatic precipitators and a new dual-flue chimney.
- Conversion from pressurized to balanced draft furnace design with the addition of new induced draft fans.
- Installation of a pressurized pneumatic fly ash handling system, a fly ash storage silo with truck loading facilities, and a traveling barge loader for fly ash and bottom ash.
- Installation of a new bottom ash drag chain conveyor system and two bottom ash storage/dewatering bins.
- Temporary use of nearby K Street property owned by BECO for construction laydown and parking for approximately 520 vehicles.

Construction of vessel docking facilities, coal unloading facilities, and the reserve coal pile and runoff ponds will occur on property presently owned by the Massachusetts Bay Transportation Authority (MBTA), located east of and adjacent to the New Boston Station site. BECO is presently negotiating with the MBTA to acquire the right to use this land. All other activities associated with the coal conversion will occur on land presently owned by BECO.

A photograph of the physical model of the postconversion New Boston Station is presented on the next page.

2.3 SUMMARY OF ENVIRONMENTAL IMPACTS

The estimated environmental impacts of the coal conversion project are presented in Section 7, with mitigative measures described in Section 11. The following discussion summarizes these impacts with reference to mitigative measures.

Air

Fugitive dust from construction and demolition activities, and coal and ash storage and handling, will be effectively controlled and only minimal impacts beyond the immediate site area are anticipated. The coal delivery vessel will be capable of self-unloading coal by means of a covered belt conveyor, and much of the delivery operation is enclosed within the vessel. The active coal storage system, including silos, conveyors, and transfer points, is totally enclosed and contains dust collection systems. A grass cover having a straw mulch base with an asphalt emulsion binder will be used to minimize dust from the established reserve coal pile. It is anticipated that the pile will be worked only during emergencies.

During coal-fired operation pollutant emissions of nitrogen oxides and sulfur dioxide are expected to increase from those experienced with oil-fired operation. However, minimal ground-level impact is expected due to the effective dispersion of these pollutants from the new, taller chimney. Little or no change in ambient air quality concentrations is expected for pollutants such as carbon monoxide, particulates, trace elements, radionuclides, and lead, due to the use of electrostatic precipitators and modern boiler combustion technology. Coal firing at New Boston Station will neither cause, nor significantly contribute to, any violation of federal or state ambient air quality standards. Emissions will be in compliance with all applicable limitations.

The contribution to acid precipitation from station air emissions is expected to be very small. This is primarily due to the proposed use of a low sulfur content coal, which will produce sulfur dioxide emissions the magnitude of which will be small in comparison to those from upwind sources. In addition, the effects of any contribution from New Boston Station will be reduced by a prevailing wind direction out to sea.

Health

only

The minimal change in ambient air quality concentrations due to the coal conversions will not cause significant health effects or changes in general health status of the population.

Noise

Construction and demolition activities during the 3 1/2-year construction period will increase daytime noise levels in the neighborhood adjacent to New Boston Station. Noisy operations will be performed during daytime periods only. Station noise levels after conversion will be reduced from existing noise levels and will be within city noise codes and state guidelines. Control measures include acoustical enclosures for the precipitators, silencers for the induced draft fans, building enclosures, and acoustical duct lagging. The coal handling system will be acoustically treated to mitigate any potential impacts, including acoustical enclosure of coal vessel unloading equipment, conveyors, motors, transfer points, silos, and coal crusher equipment.

A potential slight increase in truck noise in the station neighborhood due to the possible use of trucks for ash transport to an offsite storage/disposal area will be mitigated by the selection of routes with typical industrial carrier use and by restricting trucking times to daytime periods, Monday through Saturday.

Water

No impacts beyond temporary turbidity near New Boston Station in the Reserved Channel are anticipated during the construction period. Construction runoff will generally be contained within excavations and percolate into the soil.

No impact to groundwater quality is expected during construction or operation, due to the impervious liners for the reserve coal pile, coal pile runoff collection system, and existing wastewater treatment ponds.

Minor changes to the existing wastewater treatment system will be necessary to adequately treat station liquid wastes and coal pile runoff. Postconversion station discharges will be within state and federal effluent limitations. Maintaining concentrations within present and anticipated regulated discharge limitations should have no adverse impact on aquatic life in the Reserved Channel. Discharged cooling water temperatures will remain essentially the same, and will also be within effluent limitations.

Vessel traffic in the Reserved Channel will increase slightly due to coal deliveries and possible ash removal about once a week. Recreational water use will not be significantly impacted. All waterfront structures and facilities required for the coal conversion are to be constructed within the U.S. Pierhead and Bulkhead Line, and will not impact main channel water use.

No substantial change is expected in the extent of the 100-year floodplain for Boston Edison Company (BECO) and Massachusetts Bay Transportation Authority (MBTA) property due to the proposed coal conversion.

Approximately 25,000 cubic yards of sediment will be dredged from the Reserved Channel to provide a berthing basin for the coal delivery vessels at New Boston Station. A temporary increase in turbidity will occur in the station area during the approximate 2-month dredging period. Displaced benthic organisms will recolonize the area after completion of the dredging operation. The long-term impact of dredging on aquatic life in the Reserved Channel will be insignificant. It is expected that dredged material will be disposed of in the Massachusetts Bay Foul Area, a U.S. Environmental Protection Agency (EPA) approved interim ocean disposal site.

Land

Increased traffic during rush hours will occur during the 3 1/2-year construction period, although traffic volumes will remain below the design road capacities. Off-street parking near the station will be provided for the construction crew. Traffic impacts due to the possible use of trucks for ash removal are not expected to be significant. The industrial character of the New Boston Station property and nearby construction parking and equipment laydown areas does not provide biologically unique or important habitats. Minimal impacts to terrestrial biota are expected as a result of construction and station operation.

Safety, Aesthetics, and Socioeconomics

Construction of a new 369-foot reinforced concrete chimney should not impact Logan International Airport operations due to the presence of two nearby existing stacks at about the same height. These are located at the retired MBTA power station, about 1300 feet east of New Boston Station. Demolition of the four existing Units 1 and 2 stacks at New Boston Station will provide a visual trade-off with the new taller chimney. Other construction and demolition activities will not substantially change the industrial character of the site. Vegetative plantings are proposed to mitigate the visual impacts of the station.

The coal conversion will result in an increase in tax payments by Boston Edison Company; however, property values in South Boston will likely remain unchanged. A peak construction work force of 700 (average 500) will be required for the coal conversion of New Boston Station, which may have a positive impact on the local unemployment level. An estimated increase of 47 permanent workers will be required at the station. No adverse long-term socioeconomic impacts are expected.

Solid Waste

No significant impacts are anticipated from solid wastes generated during construction or operation at New Boston Station. Demolition materials and construction refuse will be trucked offsite to a licensed landfill or recycled to the extent practical. Asbestos removal, handling, and disposal will be performed by a licensed contractor in compliance with Occupational Safety and Health Administration, Massachusetts Department of Environmental Quality Engineering, and EPA guidelines.

Sludge from the wastewater treatment system will be trucked offsite to a licensed landfill. Coal ash will be transported offsite to a licensed storage/disposal area or used as a resource.

2.4 COST-BENEFIT SUMMARY

2.4.1 Major Benefits

Major benefits associated with the proposed coal conversion include the following:

- Reduced dependency on unstable oil imports by the annual displacement of approximately 7 million barrels of foreign oil
- An estimated $2.9 billion in fuel price savings to customers by the year 2000 from the proposed New Boston and Mystic Stations coal conversion program
- Extension of service life of boilers by an estimated 15 years
- Creation of an estimated 47 new permanent jobs at New Boston Station and an average of 500 construction jobs throughout the projected 3 1/2-year construction period
- Construction of a recreational fishing pier for public use
- Proposed landscaping improvements to Independence Square and Christopher Lee Playground
- Increased City of Boston tax base
- Creation of additional domestic employment in both the coal mining and coal transportation industries

2.4.2 Major Costs

Major costs associated with the proposed coal conversion of New Boston Station include capital expenditures totaling about $500 million and an annual increase in operating and maintenance expenses estimated at $4 million.

SECTION 3

ENVIRONMENTAL, STATUTORY, AND REGULATORY REQUIREMENTS

The following sections describe the principal environmental, statutory, and regulatory programs relevant to the New Boston Station coal conversion. Sections 3.1 and 3.2, which describe federal and state programs, respectively, are divided into the following categories: air quality, water quality, solid waste, marine environment, aviation safety (federal), public utility regulation (state), and environmental policy acts. Section 3.3 describes the Wetlands Protection Act, which is the primary locally administered program. Table 3.0-1 lists the principal programs and requirements pertinent to the New Boston Station coal conversion and references the sections where each is discussed. Also shown are the administering authorities for the various regulatory programs. A schedule for the filing of permit and license applications is provided in Section 6.4.

TABLE 3.0-1

PRINCIPAL FEDERAL, STATE, AND LOCAL REGULATORY PROGRAMS AND REQUIREMENTS
NEW BOSTON STATION COAL CONVERSION

Issue	Federal Program/ Requirement and Authority	State Program/ Requirement and Authority	Local Program/ Requirement and Authority
Air Quality	EPA: - SIP Revision Approval (3 1 1.1) - NSPS (3.1.1.2) - PSD (3.1 1.3) - GEP (3.1.1.4) - NESHAP (3 1 1 5)	DEQE: - SIP Revision (3.2 1.1) - NSPS (3.2.1.2) - PSD/NR (3.2.1.3) - GEP (3.2.1.4) - Air Plans (3.2.1.5) - NOI/Asbestos (3.2.1.6) - NESHAP (3.2.1.7)	-
Water Quality	EPA: - NPDES Permit Modification (3 1.2.1)	DEQE: - NPDES Discharge Permit Modification (3.2.2.1) - Water Quality Certification (3.2 2.2) - Industrial Waste Treatment Facilities Permit (3.2.2.3)	-
Solid Waste	EPA: - Solid and Hazardous Waste (3 1.3)	DEQE: - Solid and Hazardous Waste (3 2.3)	-
Marine Environment	COE: - Activities in Navigable Waters (3.1 4)	DEQE: - Ch 91 Waterways License (3 2.4.1) Disposal of Dredged Material Permit (3 2.4 1) CZM: - Concurrence with Consistency Certification (3.2 4 2)	BCC: - Wetlands Order of Conditions (3 3.1)
Aviation Safety	FAA: - Notice of Proposed Construction (3 1 5)		
Environmental Policy Acts	COE: - NEPA (3 1 6)	EOEA: - MEPA (3.2.5)	-
Public Utility	-	DPU: - Public Utility Regulation (3.2.6)	-

TABLE 3.0-1 (Cont)

ABBREVIATIONS

BCC	Boston Conservation Commission
COE	U.S. Army Corps of Engineers
CZM	Coastal Zone Management (Office)
DEQE	Massachusetts Department of Environmental Quality Engineering
DPU	Massachusetts Department of Public Utilities
EOEA	Executive Office of Environmental Affairs
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
GEP	Good Engineering Practice (Stack Height)
MEPA	Massachusetts Environmental Policy Act
NEPA	National Environmental Policy Act
NESHAP	National Emission Standard for Hazardous Air Pollutants
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standard
NR	Non-Attainment Review
PSD	Prevention of Significant Deterioration
SIP	State Implementation Plan

3.1 FEDERAL REQUIREMENTS

Federal regulations for protecting the environment and ensuring public safety, which are pertinent to the coal conversion project, have grown out of several legislative acts including:

Clean Air Act
Clean Water Act
Resource Conservation and Recovery Act
Rivers and Harbors Act
Marine Protection, Research and Sanctuaries Act
Coastal Zone Management Act
Federal Aviation Act
National Environmental Policy Act

The discussion below presents a brief history of these acts and regulations and examines their relevance to the New Boston Station coal conversion project.

3.1.1 Air Quality

The Clean Air Act was initially adopted by Congress in 1963 to address the increasingly widespread concern for air pollution. Major revisions of the Act were passed in 1970, 1974, and 1977. The last revision, known as the Clean Air Act Amendment (CAAA) of 1977 (Public Law 95-95) is the basis for the air pollution regulations in their present form, codified as 40CFR, Subchapter C-Air Programs. The U.S. Environmental Protection Agency (EPA) is the federal agency responsible for developing and implementing these regulations. The Clean Air Act required EPA to establish National Ambient Air Quality Standards (NAAQS) to protect the public health (primary standards) and public welfare (secondary standards) from the adverse effects of air pollution. NAAQS have now been promulgated for six pollutants: sulfur dioxide, particulates, carbon monoxide, ozone, nitrogen dioxide, and lead.

The principal means of protecting air quality is the State Implementation Plan (SIP). States are required to adopt "a plan which provides for the implementation, maintenance, and enforcement" of the NAAQS in each Air Quality Control Region (AQCR) within its territorial boundary. The SIP is the means for implementing many of the programs defined in the Clean Air Act.

One of the principal regulations of the Clean Air Act is a requirement for New Source Performance Standards (NSPS), which are emission limitations or specifications to which new or modified major sources of air pollution must adhere. Another part of the SIP is a program for Prevention of Significant Deterioration (PSD) of air quality in those areas of the country where existing levels are better than the NAAQS. There is a corollary program, New Source Review, for areas where air pollutant levels are higher than NAAQS (non-attainment areas).

This program is not discussed here because coal firing at the New Boston Station will not result in any significant impacts of non-attainment pollutants (see Sections 5.3 and 7.1). Another program is the National Emission Standards for Hazardous Air Pollutants (NESHAP) program which limits emissions of those pollutants deemed hazardous. The SIP and three programs (NSPS, PSD, NESHAP) are discussed further in the following sections.

The NSPS (40CFR60.4), PSD (40CFR52.1165), and NESHAP (40CFR61.04) programs have been delegated by EPA to the Massachusetts Department of Environmental Quality Engineering (DEQE) for implementation and enforcement. The applicability of each of these programs to the New Boston Station coal conversion is discussed in the section on state requirements, Section 3.2.1.

3.1.1.1 State Implementation Plan (SIP)

EPA reviews and has final approval of all changes to the SIP submitted as revisions by DEQE. DEQE provides supporting documentation and analyses for its SIP revision, and EPA determines the adequacy of such to ensure compliance with the provisions of the Clean Air Act. The SIP revision for the coal conversion, covering the burning of a higher sulfur fuel, is discussed in Section 3.2.1.1.

3.1.1.2 New Source Performance Standards (NSPS)

Congressional intent in establishing NSPS was to improve the air quality over time as existing sources were retired and new, cleaner facilities replaced them. NSPS for all fossil-fuel-fired steam generators, including electric utilities (>250 MBtu/hr heat input), were initially promulgated in 1971 (40CFR60 Subpart D). Standards specific to electric utility units were promulgated on June 11, 1979 (40CFR60 Subpart Da). The former set of regulations applies to new or modified facilities for which construction commenced subsequent to August 17, 1971. The revised NSPS for electric utilities are applicable to new or modified sources for which construction commenced after September 18, 1978. Table 3.1-1 summarizes both sets of standards. The DEQE has adopted the federal NSPS program [310CMR7.02(13)] and has been granted authority to manage the review process under this program (40CFR60.4) (see Section 3.2.1.2). The proposed New Boston Station coal conversion will not be subject to NSPS.

3.1.1.3 Prevention of Significant Deterioration (PSD)

On November 9, 1972, all SIPs were disapproved by EPA insofar as they failed to provide for the prevention of significant deterioration of existing air quality. Thus, in 1974 and 1975, EPA published regulations incorporating "nonsignificant deterioration" regulations into the preconstruction review process of new major sources such as steam-electric generating stations.

On August 7, 1977, Congress expanded the scope of the PSD programs by passing the CAAA of 1977. Embodied in this legislation are specific procedures to protect and maintain air quality in areas of the United States with ambient pollutant levels within national standards (attainment areas). Regulations covering PSD were initially promulgated on June 19, 1978, and were modified extensively until final promulgation on August 7, 1980 (40CFR52.21). These regulations required states to amend their SIPs to incorporate the minimum requirements of the EPA program by May 7, 1981. Based on amendments made to its SIP, DEQE was delegated authority and notification published in the Federal Register (48FR329) by EPA Region I, effective June 30, 1982, to manage its PSD program . The federal PSD program is described generally in this section, and the state-adopted program, specifically as it relates to the New Boston Station coal conversion project, is presented in Section 3.2.1.3. The PSD requirements described here are for sources which require PSD permits. The New Boston Station coal conversion will not require a PSD permit; however, ambient air quality deterioration or improvement, as defined by PSD regulations, must be considered for the project (see Section 3.2.1.3).

PSD provisions apply to new major sources of air pollution. The Clean Air Act also requires that major modifications of existing facilities undergo PSD review. A major modification is an emission increase in excess of the "de minimus" levels at an existing major source. EPA regulations (40CFR52.21) provide that an existing source is not considered a major modification (i.e., is exempt from the PSD permit requirements) if the source combusts an alternative fuel (e.g., coal), which it is capable of accommodating, and if the corresponding change is not prohibited by permit requirements established after January 6, 1975. Capable of accommodating requires an engineering demonstration that the facility was originally designed to burn the alternative fuel.

The PSD regulations are based on a system of tracking "maximum allowable increases," or increments, of criteria pollutants (those for which NAAQS have been promulgated) in the ambient air over baseline concentrations. Baseline concentrations represent air quality as it exists when the first complete PSD application is filed after August 7, 1977. Increment tracking is performed through atmospheric dispersion modeling to determine the air quality impact of a proposed source using procedures specified by EPA.

Congress established three levels of increments for three types of areas of the country: Class I areas, which include national parks and wilderness areas, where only small levels of air quality deterioration are allowed; Class II areas, where a larger degree of pollution is allowed; and Class III areas, where the most degradation is allowed. If an ambient air quality standard would be exceeded by use of the full increment, the site-specific PSD limit is reduced to ensure compliance with the NAAQS. Table 3.1-2 lists the allowable increments by class for sulfur dioxide (SO_2) and total suspended particulates (TSP), the only pollutants for which increments have been established thus far. All of Massachusetts is designated as a Class II area.

The PSD provisions of the Clean Air Act also specify that major new and modified sources located in attainment areas install best available control technology (BACT). BACT is determined on a case-by-case basis, taking into account energy, environmental, and economic factors. BACT must be at least as stringent as controls required to meet NSPS. BACT must be applied for each air pollutant emitted by a PSD source in excess of specified "de minimus" emission levels.

PSD provisions also include specific requirements for collection of ambient air quality monitoring data in the area of impact of a proposed facility.

3.1.1.4 Good Engineering Practice

"Good Engineering Practice" (GEP) stack or chimney height rules or regulations were developed by EPA under Section 123 of the Clean Air Act (CAA) "to assure that the degree of emission limitation required for the control of any air pollutant under an applicable SIP is not affected by the portion of any stack height which exceeds GEP. A stack height built according to GEP is just high enough to prevent winds deflected by nearby structures or terrain from washing the plume down toward the ground in the immediate vicinity of the stack. EPA issued final rules to implement this requirement in the February 8, 1982, Federal Register (44FR5863 et seq). The GEP stack height rules do not prohibit construction of stacks either less than or greater than GEP height; however, the GEP height is the limit that may count toward emissions control credit. In addition, for stacks shorter than GEP height, technical analyses to determine compliance with ambient air quality criteria must account for the potential of adverse aerodynamic effects. As part of PSD delegation, EPA delegated authority for these requirements to DEQE.

3.1.1.5 National Emission Standards for Hazardous Air Pollutants (NESHAP)

The NESHAP program of the Clean Air Act addresses those pollutants to which ambient air quality standards do not apply but nevertheless contribute to air pollution which can cause detrimental health effects. The only potentially applicable NESHAP for the New Boston Station coal conversion project is the

NESHAP which provides control measures for asbestos emissions during renovation or demolition of structures containing friable asbestos. EPA has delegated authority to DEQE to administer this program; therefore, it is discussed more fully in Section 3.2.1.7.

3.1.2 Water Quality

The Federal Water Pollution Control Act Amendments of 1972 established a comprehensive program to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To implement this Act, EPA was given authority to issue effluent standards, pretreatment standards, and new source performance standards for industrial discharges. In 1977, the Clean Water Act was enacted (Public Law 95-217) to further amend and update the Federal Water Pollution Control Act. Section 402 of the Clean Water Act addresses industrial liquid effluents and is the primary portion of the Act which pertains to this proposed coal conversion.

3.1.2.1 National Pollutant Discharge Elimination System (NPDES)

Section 402 of the Clean Water Act establishes the NPDES for the permitting of point source discharges to waters of the United States. Standards applicable to the steam electric generating category (40CFR423) were most recently promulgated on November 19, 1982. The types of effluent limitations applicable to this project are:

1. BAT (best available technology economically achievable) for controlling the direct discharge of toxic and nonconventional pollutants.

2. BCT (best conventional pollutant control technology), for controlling discharges of conventional pollutants from existing industrial point sources.

3. BPT (best practicable control technology currently available), for controlling conventional pollutants, generally are based on the average of the best existing performance at plants of various sizes, ages, and unit processes.

The November 19, 1982 regulations deferred promulgation of BCT until a future date, and BPT requirements for conventional pollutants will remain in effect until superseded.

Existing point-source liquid effluent discharges from New Boston Station are regulated by EPA and DEQE through an NPDES permit under a cooperative Memorandum of Understanding. New Boston Station is currently operating under an extension of the expired NPDES permit. A modification of this permit for oil-fired operation is currently in EPA review. A further modification of the NPDES permit will be requested from EPA for the coal conversion. A discussion of the existing New Boston Station wastewater treatment system is included in Section 4.7.5 and waste streams from the station are identified in Table 3.1-3. Figure 3.1-1 identifies existing waste stream outfall locations. Table 3.1-4 itemizes the existing NPDES limitations for New Boston Station effluents.

Postconversion station liquid discharges will remain similar to existing discharges. Additional raw waste streams due to the coal conversion are listed in Table 3.1-3. No additional outfalls to the Reserved Channel will be created by the coal conversion.

The renewed NPDES permit for the current oil-fired operation and the subsequent modified permit for the coal-fired operation will include requirements for compliance with BCT for conventional pollutants and BAT for nonconventional and toxic pollutants. Until BCT requirements are promulgated, BPT requirements for conventional pollutants will apply. Changes in effluent limitations are anticipated in the renewed NPDES permit for New Boston Station. EPA Region I has indicated limits of 1.0 mg/l average and 2.0 mg/l maximum allowable discharge. Concentrations for nickel and zinc will be established for outfall 011, the wastewater treatment system discharge (see Table 3.1-4). In addition, the limit for total suspended solids (TSS) in discharges from outfall 005 is anticipated to be rescinded, since filter backwash is now directed to the wastewater treatment system. Residual chlorine limits at outfalls 001 and 002 may increase as a result of a relaxation in effluent limitations (40CFR423). No significant alterations in cooling water discharge or intake operations are anticipated for the coal conversion project.

An application for a permit modification due to the treatment of additional wastes from the coal conversion of Units 1 and 2 is being submitted to EPA. The NPDES permit modification required for coal-fired operation of New Boston Station will alter effluent limits for outfall 011 only. In addition to trace metal discharges described above and other effluent discharges noted in Table 3.1-4, outfall 011 will include discharges of treated coal pile runoff and periodic bottom ash-handling system blowdown. It is anticipated that TSS in discharges from this outfall will be limited to 100 mg/l maximum TSS at any time. Emergency discharge of coal pile runoff may occur during excessively stormy weather conditions. This is allowed by Federal Regulation (40CFR423.15).

Coal Pile Runoff

Current BPT and BAT federal regulations for steam electric power plants require that treated coal pile runoff volumes equal to or less than the 10-year, 24-hour storm event, have a pH within the range of 6.0 to 9.0, and have a TSS content not exceeding 50 mg/l. Any untreated overflow of coal pile runoff which results from a rainfall event in excess of the 10-year, 24-hour rainfall event is excluded (40CFR423). Coal pile runoff will be routed to the wastewater treatment system for pH adjustment and TSS reduction prior to discharge in accordance with NPDES permit limitations. No separate requirements will apply for the coal pile runoff waste stream.

Bottom Ash Handling

There will be no routine wastewater releases from the bottom ash handling system (see Section 6.2.6). Blowdown will occur only during maintenance periods and will be routed to the wastewater treatment system prior to discharge.

Based on November 1982 effluent standards, the pollutant contribution from the bottom ash handling blowdown flow is limited to maximum daily discharge concentrations of 100 mg/l TSS and 20 mg/l of oil and grease (40CFR423). Average daily (for 30 consecutive days) discharge concentrations are not to exceed 30 mg/l TSS and 15 mg/l oil and grease. Also, pH of the bottom ash-handling discharge must be within the range of 6.0 to 9.0. The station wastewater treatment system discharge will meet NPDES permit limitations, and no separate requirements will apply for the bottom ash handling system waste stream.

3.1.3 Solid Waste

The Resource Conservation and Recovery Act (RCRA) of 1976 (PL94-580) provides the overall framework for federal regulation of waste disposal on land. For nonhazardous wastes, RCRA established requirements and guidelines which states incorporate into their programs. There is no direct federal regulation of nonhazardous waste; in Massachusetts this is regulated at the state level by the DEQE (see Section 3.2.3). Section 4004 of RCRA establishes sanitary landfills as the only acceptable disposal method for nonhazardous waste.

For hazardous wastes, Subtitle C of RCRA required EPA to develop a national program for the control of hazardous wastes from their point of generation to their ultimate disposal. Regulations for the identification, generation, storage, treatment, transport, and disposal of hazardous wastes (40CFR260 through 265) plus a facility permitting program (40CFR122 through 124) have been promulgated. EPA has proposed to delegate this authority to the states, and is doing so in phases. Massachusetts has received Phase I authority. Phase I establishes regulations for the initial identification and listing of hazardous wastes, the standards applicable to generators and transporters of hazardous wastes, including a manifest system, and the "interim status" standards applicable to existing hazardous waste facilities before they receive permits. A discussion of the Massachusetts Hazardous Waste Program is included in Section 3.2.3.

Under current RCRA regulations, electric utility fly ash and bottom ash are specifically exempt from being classified hazardous. Disposal of coal ash will thus be in licensed sanitary landfills, pursuant to state requirements (Saguinsin 1981).

Wastewater treatment sludges and other station wastes generated by electric utilities are not exempt from compliance with RCRA hazardous waste standards and must be tested, as a minimum, for the four characteristics defining hazardous waste: ignitability, corrosivity, reactivity, or toxicity, in order to determine their classification for disposal. New Boston Station has RCRA "interim status" for the wastewater treatment system since wastewater is "corrosive" and has to be neutralized, and thereby rendered nonhazardous.

3.1.4 Marine Environment

Congress delegated to the U.S. Army Corps of Engineers (COE) the responsibility of administering federal laws that regulate activities in navigable waters of the United States and the oceans. COE-administered legislation which pertains to navigable waters is Section 10 of the Rivers and Harbors Act of 1899 and Section 103 of the Marine Protection, Research and Sanctuaries Act. In addition, Section 404 of the Clean Water Act regulates the discharge of dredged or fill materials into "waters of the United States." The COE administers the permit program for this activity, whose principal requirement is that a clear need to dispose of the dredged or fill material in the water must be demonstrated. Regulation of dredging activities occurs in conjunction with implementation of the Rivers and Harbors Act.

Under Section 10 of the Rivers and Harbors Act, a COE permit is required for any structure or work (e.g., dredging) in or affecting the navigable waters of the United States. Among the proposed structures or work requiring a permit under Section 10 are waterfront docking structures. Transportation of dredged material for disposal in ocean waters, as proposed for the New Boston Station dredged material, falls under Section 103 of the Marine Protection, Research and Sanctuaries Act. The Act requires that the COE utilizes, to the maximum extent feasible, ocean dumping sites that have been designated by EPA. Before issuing a permit, the COE must determine that the proposed dumping will not unreasonably degrade or endanger human health or welfare, or the marine environment, ecological systems, or economic potentialities. This determination is made using ocean dumping criteria established by the EPA. Pending review by the COE of the dredged material characteristics and approval for ocean disposal, it is proposed that the dredged material be transported to the Massachusetts Bay Foul Area, an interim designated ocean disposal site recently employed by the COE for disposal of dredged material from Boston Harbor. A COE permit application for the New Boston Station coal conversion has been submitted. Information provided in the application includes details for the proposed waterfront facilities (e.g., sketches, descriptions) and dredged material characteristics.

Prior to the issuance of the COE permit, the COE must be in receipt of the state Water Quality Certification (Section 401 of the Clean Water Act), and Coastal Zone Management (CZM) Office approval of a consistency certification, and must comply with the National Environmental Policy Act (NEPA) requirements described in Section 3.1.6.

3.1.5 Aviation Safety

In accordance with the Federal Aviation Administration (FAA) regulations (14CFR77.13), a "Notice of Proposed Construction or Alteration" for the proposed chimney for New Boston Station was submitted to the FAA in January 1983. An FAA "Determination of No Hazard to Air Navigation" has been received for the proposed chimney.

Figure 3.1-2 depicts the location of the proposed 369-foot New Boston Station chimney with respect to Logan International Airport. It is not likely that the proposed chimney will impact current Logan International Airport operations or airspace use since two stacks of approximately the same height are located 1300 feet due east of the proposed chimney at the retired Massachusetts Bay Transportation Authority power plant.

3.1.6 National Environmental Policy Act (NEPA) Requirements

Congress passed the National Environmental Policy Act in 1969 (Public Law 91-190) to ensure that environmental values be given consideration along with technical and economic issues before major federal actions are approved. The Council on Environmental Quality (CEQ) was established by NEPA to oversee its implementation. Each federal agency involved in the regulation of a proposed project, unless exempted, must follow a NEPA review process and make a determination of whether its regulating activities will constitute a major federal action. If this is not the case, then the Environmental Impact Statement (EIS) requirements of NEPA do not apply and an Environmental Assessment (EA) is prepared by the federal agency. A Finding of No Significant Impact (FONSI) is issued after evaluating the EA and resolving any public comments. If the regulating activities are considered to be a major federal action, NEPA requires that an EIS be prepared. Under CEQ regulations, each federal agency regulating a major federal action is responsible for preparing its own EIS. The individual or organization seeking the federal permit may be requested to prepare an environmental information document to assist the federal agency in determining whether an EIS is required.

The following federal actions involving the New Boston Station coal conversion project were analyzed and determined not to be major federal actions requiring an EIS.

- Federal air quality permits issued by EPA are exempt by law from EIS requirements of NEPA. In any case, no federal air quality permits are required for the New Boston Station coal conversion project (see Section 3.1.1).

- A modification of the existing NPDES permit, issued jointly by the EPA and DEQE, will be required. No new waste stream outfalls to the Reserved Channel would be created by the coal conversion, so the modification most probably will not constitute a major federal action, based on discussions with the EPA.

- The conversion project includes construction of a 369-foot chimney at New Boston Station. A "Notice of Proposed Construction or Alteration" has been reviewed by FAA in accordance with the FAA Regulations (14CFR77.13). FAA review of the proposed chimney is not a major federal action.

The COE regulates construction of waterfront facilities, dredging of a berthing basin for coal delivery vessels, and ocean disposal of dredged materials for the coal conversion pursuant to 33CFR322, Permits for Structures or Work in or Affecting Navigable Waters of the United States, and 33CFR325, Permits for Ocean Dumping of Dredged Material. A determination of whether the actions involved in issuing the COE permit trigger an EIS requirement has not been made.

Based upon procedures for implementing NEPA promulgated by the COE on August 25, 1980 (33CFR230), after issuing public notice announcing receipt of the permit application, the COE will review the permit application and will make a determination as to whether the project constitutes a major federal action requiring the preparation of an EIS. As part of his process, COE will solicit public comments and prepare an EA of the environmental issues associated with the proposed project and its alternatives. The COE will then issue either a FONSI or a determination that an EIS is required. If a FONSI is issued, there would be a comment period, after which the COE would prepare a Statement of Findings (SOF) to be issued with the COE permit. If an EIS is required, the COE and/or a third party would prepare the Draft EIS with input from BECO. Following a Notice of Intent, public comment period, and possible public hearings, a Final EIS would be prepared. After comments on the Final EIS are received, a Record of Decision would be prepared by the COE. Federal permits may be issued 30 days after Notice of the Final EIS and the Record of Decision.

3.1.7 Reference

Saguinsin, J.L.S. Northeast Regional Environmental Impact Study: Waste Disposal Technical Report DOE/RG/0058. Argonne National Laboratory, Argonne, IL. For Office of Fuels Conversion, ERA, DOE, Washington, D.C. 1981.

TABLE 3.1-1

STANDARDS OF PERFORMANCE
STEAM ELECTRIC GENERATING UNITS

Source Category	Fuel	Pollutant	Emission Standard
Fossil Fuel Fired Steam Generators Greater Than 250 MBtu/hr (1)	Coal	PM	0.10 lb/MBtu
		Opacity	20%
		SO_2	1.20 lb/MBtu
		NOx	0.7 lb/MBtu (0.6 lb/MBtu for lignite)
	Oil or Gas	PM	0.10 lb/MBtu
		Opacity	20%
		SO_2 (Oil)	0.80 lb/MBtu
		NOx (Oil)	0.30 lb/MBtu
		NOx (Gas)	0.20 lb/MBtu
Electric Utility Steam Generating Units Greater Than 250 MBtu/hr (2)	Coal	PM	0.03 lb/MBtu
		Opacity	20%
		SO_2	1.20 lb/MBtu and 90% reduction, except 70% reduction when emissions are less than 0.60 lb/MBtu
		NOx	0.60 lb/MBtu (0.50 lb/MBtu subbituminous coal)
	Oil or Gas	PM	0.03 lb/MBtu
		Opacity	20%
		SO_2	0.80 lb/MBtu and 90% reduction, or 0.20 lb/MBtu with no reduction requirement
		NOx (Oil)	0.30 lb/MBtu
		NOx (Gas)	0.20 lb/MBtu

NOTES:

1. Includes electric utility fossil-fuel-fired generators for which construction or modification commenced subsequent to August 17, 1971.
2. Applies to sources for which construction or modification commenced subsequent to September 18, 1978.

TABLE 3.1-2

ALLOWABLE PREVENTION OF SIGNIFICANT DETERIORATION INCREMENTS

	Total Suspended Particulate, ug/m³		Sulfur Dioxide, ug/m³		
	24-Hr Maximum	Annual Geometric Mean	3-Hr Maximum	24-Hr Maximum	Annual Arithmetic Mean
Class I	10	5	25	5	2
Class II	37	19	512	91	20
Class III	75	37	700	182	40

TABLE 3.1-3

WASTE STREAMS FROM NEW BOSTON STATION

Outfall No.(1)		Existing Description
001		Circulating water, Unit 1
002		Circulating water, Unit 2
004		Frequency changer heat exchanger
005		Boiler condensate drains (Units 1 & 2)
006		Condenser backwash, Unit 1
007		Condenser backwash, Unit 2
011	a.	Floor drains
	b.	Water treatment waste
	c.	Boiler blowdowns
	d.	Boiler fireside and air heater washes
	e.	Boiler, feedwater heater, and condenser chemical cleanings
	f.	Other equipment washes
		Postconversion(2)
011	g.	Coal pile runoff
	h.	Bottom ash handling maintenance blowdown
	i.	Ash truck washwater

NOTES:

1. See Figure 3.1-1 for outfall locations.
2. Existing waste streams will remain unchanged following the coal conversion, with the exception of outfall 011, which will carry wastes from the sources a-f, in addition to sources g-i.

NEW BOSTON STATION - DEIR

TABLE 3.1-4

EXISTING NPDES WATER QUALITY LIMITATIONS FOR NEW BOSTON STATION (7)

Outfall Number (8)	001	002	004	005	006 & 007	011
Flow (mgd)	258(258) (1)	232(232) (1)	6.3(6.3) (1)	0.043(0.086) (1)	40(40) (1)	1.0(2.0) (1)
Temperature (°F)	25(96) (2)	25(96) (2)	12(85) (2)	212 (3)	120 (3)	
pH (standard units)	6.5(8.5) (4)	6.5(8.5) (4)	6.5(8.5) (4)	6.0(9.0) (4)	6.0(9.0) (4)	6.5(8.5) (4)
Oil & grease (mg/l)						10(15) (1)
Iron (mg/l)						1.0(1.0) (1)
Copper (mg/l)						1.0(1.0) (1)
Nickel (mg/l)						1.0(2.0) (1,5)
Zinc (mg/l)						1.0(2.0) (1,5)
Residual chlorine (mg/l)	0.1(0.1)	0.1(0.1)				
Total suspended solids (mg/l)				30(100) (6)		30(100) (1)

NOTES:

1. Daily average (daily maximum).
2. Maximum temperature rise (maximum temperature).
3. Maximum temperature.
4. Not less than (nor more than). It is anticipated that pH limitations will be 6.0 (9.0) for all New Boston Station outfalls for the modified NPDES permit for oil-fired operation.
5. Anticipated limit to be applied by the modified permit with oil-fired operation, currently in EPA review.
6. Filter backwash has now been removed from outfall 005 and is included in outfall 011, eliminating the need for this TSS limitation at outfall 005.
7. New Boston Station is currently operating under an extension of the expired NPDES permit. A modification of this permit for oil-fired operation is currently in EPA review. A further modification of the NPDES permit will be requested from the EPA for the coal conversion.
8. Outfall waste stream descriptions are provided in Table 3.1-3.

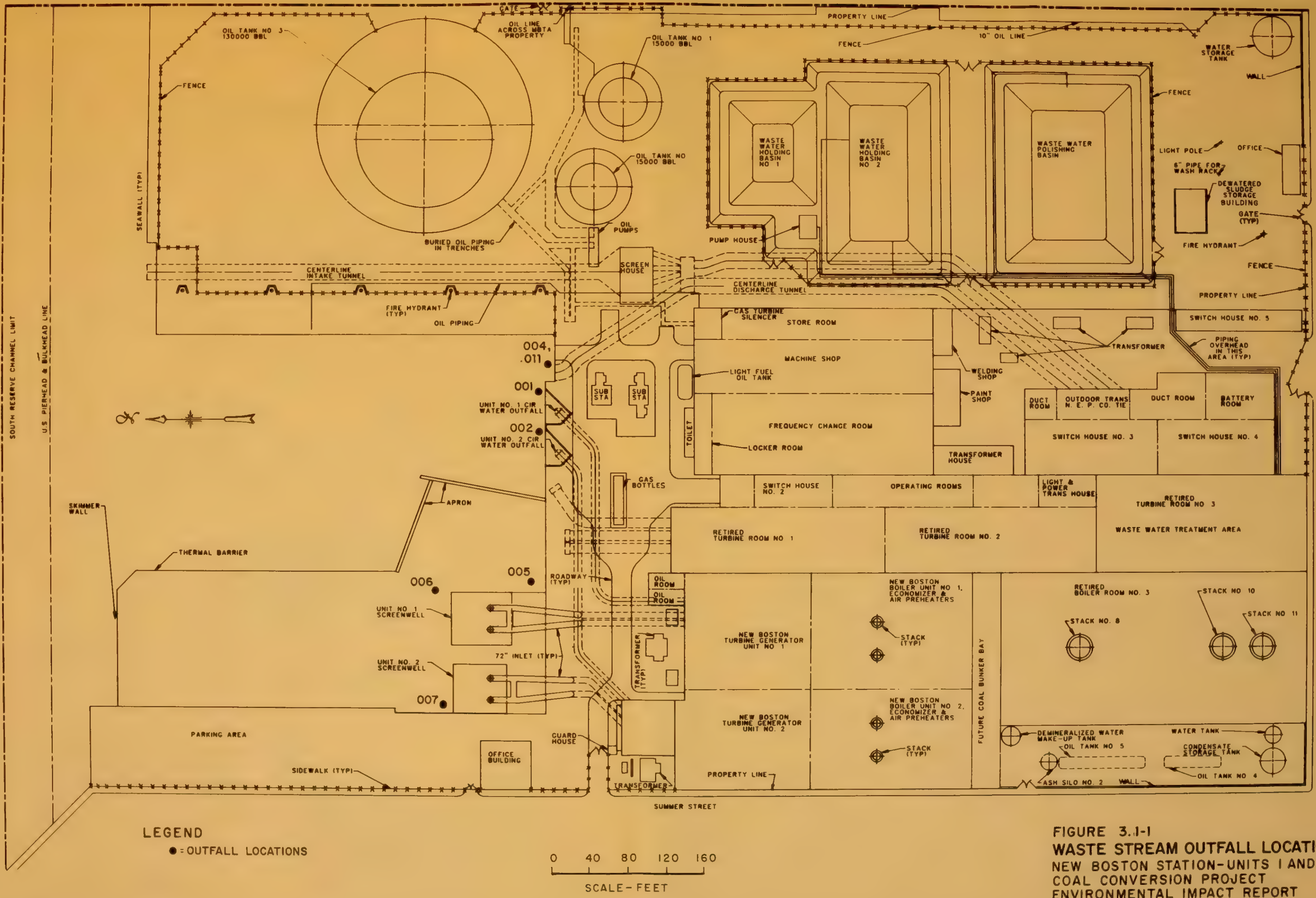
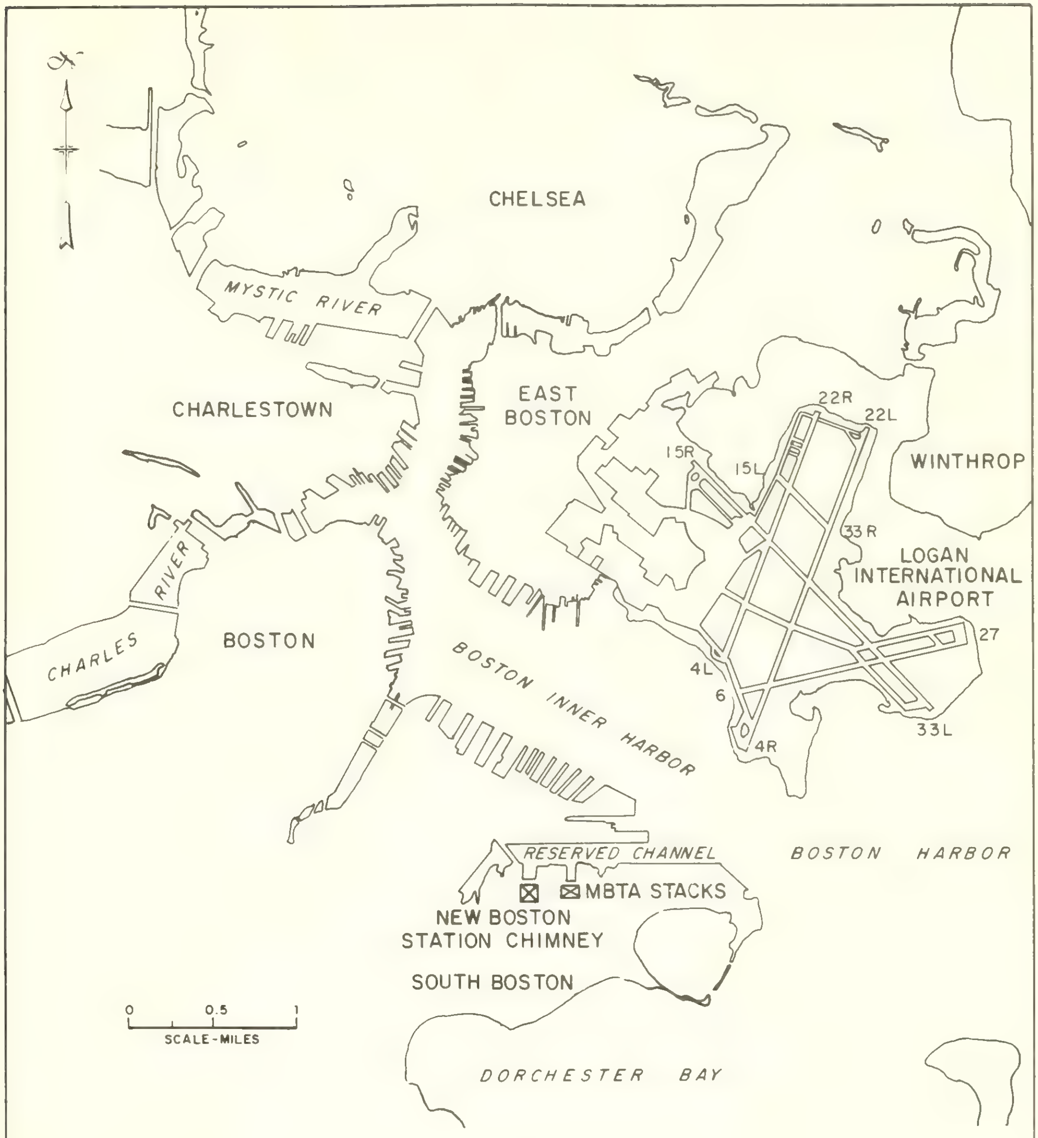


FIGURE 3.1-1

WASTE STREAM OUTFALL LOCATIONS

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NEW BOSTON STATION PROPOSED CHIMNEY HEIGHT - 369 FT
TOP ELEVATION OF CHIMNEY - 380 FT MSL
MBTA STACKS (2) - 380 FT MSL TOP ELEVATION

FIGURE 3.1-2
PROPOSED CHIMNEY LOCATION
WITH RESPECT TO LOGAN AIRPORT
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

SOURCE: Instrument Approach Procedures,
U.S. Northeast, U.S. Dept of Commerce,
Washington, D.C., 1982

3.2 STATE REQUIREMENTS

State regulatory programs pertinent to the New Boston Station coal conversion are administered by the Massachusetts Department of Environmental Quality Engineering (DEQE), the Massachusetts Coastal Zone Management (CZM) Office, and the Massachusetts Environmental Policy Act (MEPA) unit of the Executive Office of Environmental Affairs (EOEA). This discussion is divided into the following topics: air quality, water quality, solid waste, marine environment, and Environmental Policy Act. In addition, a brief discussion of the role of the Massachusetts Department of Public Utilities (DPU) is provided as requested in the EOEA scoping document for the Environmental Impact Report (EIR). The EOEA scoping document also requires a discussion of the status of the purchase of Massachusetts Bay Transportation Authority (MBTA) property. This subject is addressed in Section 6.2.1.

3.2.1 Air Quality

3.2.1.1 State Implementation Plan

As discussed in Section 3.1, federal regulations implementing the Clean Air Act (CAA) require states to develop State Implementation Plans (SIPs) to attain and maintain ambient air quality standards (40CFR51). States reserve the right to tailor their SIPs to their specific needs as long as federal requirements, at a minimum, are met. Under the Massachusetts SIP, conversion of New Boston Station Units 1 and 2 to coal will require DEQE approval of air pollution control related plans (310CMR7.02) discussed in Section 3.2.1.5, and revision of the SIP for sulfur in fuel.

The proposed conversion requires BECO to submit a SIP revision application to DEQE. Following DEQE review and concurrence with the BECO application, DEQE will then submit to U.S. Environmental Protection Agency (EPA) a SIP revision similar to those for other Massachusetts coal conversions. This SIP revision would allow the use of coal with 1.21 lb sulfur/MBtu heat release potential (310CMR7.17). It is expected that no Prevention of Significant Deterioration (PSD) permit will be required, and New Source Performance Standards (NSPS) requirements will not apply because New Boston Station was capable of burning coal prior to regulatory deadlines. However, the PSD and NSPS programs are discussed in Sections 3.2.1.2 and 3.2.1.3 for the information of the reader and at the request of the MEPA unit of the EOEA in its scoping document for the EIR. A chronological development of the portions of the Massachusetts SIP most relevant to the New Boston Station coal conversion project is presented in this section.

Over the years, DEQE has refined the SIP through variances and revisions and has encouraged conversion to coal or other alternate fuels due to the cost advantages for consumers and the

Commonwealth, while at the same time mandating compliance with ambient air quality standards and the protection of public health.

The Massachusetts SIP is a collection of all of Massachusetts air quality control regulations and additional documents providing plans for attainment of ambient standards in areas where standards are currently exceeded. The plans address primary particulate standards in Worcester, primary and secondary carbon monoxide (CO) standards in "hot spot" locations in Boston, Cambridge, Quincy, Medford, and Watertown, and primary and secondary ozone standards throughout the state.

On May 4, 1978, DEQE compiled in the Code of Massachusetts Regulations (CMR) format all air pollution regulations in effect as of January 1, 1978 (310CMR6.00 through 310CMR8.00). These regulations comprised the Massachusetts SIP and included sections pertinent to fossil-fuel fired facilities such as New Boston Station (e.g., Section 6.00, Ambient Air Quality Standards as shown in Table 5.3-1; Section 7.02, Plan Approval and Emission Limitations; and Section 7.05, Fuels). Section 7.02 provided particulate emission limits, shown on Table 3.2-1, which remain in effect as of the latest CMR compilation on September 30, 1982. Section 7.02 also incorporated, by reference, federal NSPS and National Emission Standards for Hazardous Air Pollutants (NESHAP).

Section 7.05 provided temporary fuel use provisions which were effective between July 1, 1975, and July 1, 1978. These provisions relaxed the sulfur-in-fuel content requirement from 0.28 lb/MBtu (approximately 0.5 percent sulfur content fuel oil) for certain source categories. The relaxation considered the economic penalty of a low sulfur fuel requirement after the 1973-1974 energy crisis. This section allowed electric generating facilities with heat inputs greater than 2500 MBtu/hr in critical areas of concern in the Metropolitan Boston Air Pollution Control District (MBAPCD), e.g., the New Boston Station, to burn fuel with a sulfur content not to exceed 0.55 lb/MBtu heat release potential (approximately 1 percent sulfur content fuel oil). This permission was contingent upon a successful demonstration that ambient air quality values would be protected when burning higher sulfur fuel, and the utility had a 3-day onsite supply of lower sulfur fuel, and was able to switch to the low sulfur fuel on a 3-hour notice if so ordered by DEQE because of adverse meteorological conditions. Other fossil fuel facilities in the critical areas of concern were required to burn fuel with a sulfur content of 0.28 lb/MBtu heat release potential or less.

Ash content was also regulated in Section 7.05, allowing a maximum 9 percent ash content fuels. Higher ash content fuel could be used if it were demonstrated to DEQE that the higher ash content would not cause a violation of the particulate matter emission limit of 0.12 lb/MBtu or ambient air quality standards.

On August 17, 1978, the first Massachusetts regulation (310CMR7.17) specifically relating to coal conversion was published. After a demonstration that ambient air quality standards would not be violated, Brayton Point Station of the New England Power Company in Somerset was allowed to burn coal with a sulfur-in-fuel content equivalent to 1.21 lb/MBtu heat release potential on a 30-day average and 2.31 lb/MBtu on a 24-hour average. New England Power Company also agreed to meet a particulate matter emission rate of 0.08 lb/MBtu heat input, which was well below the 0.12 lb/MBtu SIP emission limitation. The impetus for the conversion was a $10 million projected annual consumer savings, as noted in the DEQE transmittal of the regulation to the Secretary of the Commonwealth.

The next amendment to the Massachusetts SIP of potential relevance to New Boston Station was the incorporation by reference of the federal Emission Offset Interpretive Ruling (EOIR) on May 10, 1979. EPA published the EOIR on January 16, 1979, to allow the permitting of new sources locating in, or affecting, non-attainment areas. The only pollutants in the Metropolitan Boston area which are not in attainment of National Ambient Air Quality Standards (NAAQS) are particulates, carbon monoxide (CO), and ozone for which the New Boston Station coal conversion will not cause any significant new impacts (see Section 7.1). Therefore, non-attainment rules do not apply to the New Boston Station coal conversion.

DEQE requirements for the conversion of Mt. Tom Power Plant of Holyoke Water Power Company were included in 310CMR7.17 on February 4, 1982. The regulation limited particulate matter (PM) emissions to 0.08 lb/MBtu heat input and specified a sulfur-in-fuel emission limit by reference to Section 7.05 (1)(e), which allows a sulfur-in-fuel content equivalent of 1.21 lb/MBtu heat release potential.

In June 1982, another major SIP revision was promulgated. DEQE further clarified its provisions for new sources in non-attainment areas by adding Appendix A, Emission Offsets and Non-Attainment Review, to Section 7.00.

3.2.1.2 New Source Performance Standards (NSPS)

Under the federal NSPS program which DEQE has adopted, an existing facility would be considered "modified" if there is any physical change in, or change in the method of its operation, which increases the amount of air pollutant emissions to the atmosphere. Provision has been made for exemptions from the modification definition, and therefore from NSPS applicability for boilers originally designed to accommodate the burning of an alternative fuel (e.g., coal) (40CFR60.14). A demonstration that New Boston Station Units 1 and 2 were designed to accommodate coal is being submitted to DEQE and EPA.

Another method by which an existing source is subject to NSPS is if it were classified as a reconstructed source (essentially a "new" source). Reconstruction is considered to have taken place if the fixed capital cost of the replacement components exceeds 50 percent of the fixed capital cost of a comparable entirely new facility and if it is technically and economically feasible for the source to meet the applicable NSPS (40CFR60.15).

The fixed capital costs associated with the conversion to coal of New Boston Station Units 1 and 2 are substantially less than 50 percent of the fixed capital costs of a comparable new facility. Therefore, NSPS are not expected to apply to coal firing at New Boston Station.

3.2.1.3 Prevention of Significant Deterioration (PSD) and Non-Attainment Review

The proposed New Boston Station coal conversion is exempt from PSD requirements because it is not considered a modification under PSD regulations (see Section 3.1.1.3). This exemption applies because Units 1 and 2 of New Boston Station were capable of accommodating coal before January 6, 1975 [40CFR52.21(b)(2)(iii)].

DEQE assumed authority for the PSD program for sources located in attainment areas on June 30, 1982 (48FR329). EPA delegated the PSD program to DEQE under conditions that DEQE implement the program in accordance with the federal requirements described in Section 3.1.1.3 and DEQE's own PSD procedures (DEQE 1983). DEQE must provide EPA with an opportunity to comment on all draft permits, including DEQE proposed actions, during the public comment period.

Because the New Boston Station coal conversion is exempt from PSD requirements, it will not set the PSD baseline for any area. Whether combined with the simultaneous coal conversion of the Mystic Station, or considered alone, the New Boston Station coal conversion will not significantly limit any future development in Metropolitan Boston. In some areas, more PSD increment will be made available for future development, as indicated in Section 7.1.2.3.

The New Boston Station coal conversion is excluded by definition from the requirements of Non-Attainment Review because it is not considered a major modification under the provisions in 310CMR7.00. Specifically, the units were capable of accommodating coal prior to January 6, 1975.

For the information of the reader and as requested in the EOEA scoping document for the EIR, a discussion of Non-Attainment Review is presented below, although it is not applicable to the New Boston Station coal conversion.

For sources located in, or significantly impacting, a non-attainment area (an area not meeting an ambient air quality standard), DEQE has permitting authority under 310CMR7.00, Appendix A, Emission Offsets and Non-Attainment Review, published on June 18, 1982. In accordance with this regulation, a major new or modified source locating in a non-attainment area must control emissions of those pollutants for which the area is non-attainment to "the greatest degree possible," and obtain "equivalent offsetting emission reductions." In addition, it must be demonstrated that there will be progress toward achievement of NAAQS, and that the new or modified source emissions will not cause any new violation of an NAAQS or worsen an existing violation. If any emission source located in an attainment area is projected to have a significant impact in any non-attainment area, it must also control emissions or obtain emission offsets in the non-attainment area so that no significant impact results. The significant ambient impact concentrations that must not be exceeded are listed in Table 3.2–2 (DEQE 1983).

Major modification sources do not have to comply with 310CMR7.00, Appendix A if they employ reasonably available control technology (RACT) and total emissions from the modified source do not exceed the total emissions from the source prior to the application for the modification by a significant amount. Significant emission levels are listed in Table 3.2-3.

3.2.1.4 Good Engineering Practice Stack (or Chimney) Height Requirements

DEQE is responsible for implementing chimney or stack height regulations as part of the Massachusetts SIP. The GEP stack height for the proposed stack at the New Boston Station is 423 feet above grade (see Section 11.2.3.2). However, because of the proximity of Logan International Airport and Federal Aviation Administration (FAA) regulations concerning the potential for interference with airport flight paths, a stack height of 369 feet is proposed for this project. All air quality impact analyses have considered the slight potential for adverse aerodynamic effects associated with the actual proposed stack height. EPA and DEQE reviews of the technical support for the SIP revision proposed for the New Boston Station coal conversion project will include reviews of the stack height determination (see Appendix C).

3.2.1.5 Air Plans Approval

Massachusetts regulations state that no person shall construct, substantially reconstruct, or alter any regulated facility unless the plans, specifications, proposed Standard Operating Procedure, and the proposed Maintenance Procedure (Air Plans) for such facility have been submitted to and approved by the DEQE (310CMR7.02). Approval is required for pollution control systems proposed for each of several emission sources associated with the proposed coal conversion of New Boston Station Units 1 and 2.

3.2.1.6 Notification of Intent to Demolish a Structure Containing Asbestos Covered Material

Demolition involving removal of asbestos-covered material, if any, requires prior notification to DEQE under 310CMR7.15. Control methods for removal and disposal of asbestos material will be included in the Notification of Intent to be filed prior to commencement of demolition activities at New Boston Station.

3.2.1.7 National Emission Standard for Hazardous Air Pollutants (NESHAP)

The Air Plans specifically require facilities subject to any federal NESHAP to continue to comply with the regulation when under DEQE jurisdiction [310CMR7.02(13)]. As mentioned in Section 3.2.1.6, the removal and disposal of asbestos containing material may be required at New Boston Station and the NESHAP for asbestos could apply to these operations. Federal and state requirements are similar in prohibiting a condition of asbestos air pollution.

3.2.2 Water Quality

3.2.2.1 National Pollutant Discharge Elimination System (NPDES) Permit Modification

As discussed in Section 3.1, the NPDES permit which regulates station liquid effluents, is issued jointly by EPA and the DEQE, Division of Water Pollution control. The state requirements are substantially the same as those of EPA.

3.2.2.2 Water Quality Certification

Any project requiring a federal or state license or permit to conduct activities which may result in new or modified discharges to water must obtain a state Water Quality Certification before a license or permit may be issued [MGL c.21, Section 27(12)]. The certification ensures that state water quality standards and related requirements are met. It is always associated with another license or permit, is generally required prior to issuance of the other permit, and is issued by the Division of

Water Pollution Control (DWPC) within DEQE. Water Quality Certifications are necessary for the New Boston Station coal conversion due to the proposed dredging activity and due to the modification of station wastewaters, as regulated by the NPDES permit. A certification application must be submitted to the DWPC for dredging. No separate submittal is required for the NPDES permit modification.

3.2.2.3 Industrial Waste Treatment Facilities Permit

Any plant utilizing new industrial wastewaster treatment facilities or significantly modifying existing facilities requires the approval of the Division of Water Pollution Control within DEQE [MGL c.21 Section 27(13)]. This approval is to protect water quality and consists of a technical review of an engineering report and/or plans of the proposed or modified wastewater treatment facilities, and is normally addressed during the final design phase of a project.

3.2.3 Solid Waste

The treatment, storage, and disposal of solid wastes generated at New Boston Station following the conversion to coal will be regulated under the Massachusetts Solid Waste Disposal Law (MGL c.16, Section 18-24B, Section 150A), and potentially regulated under the Massachusetts Hazardous Waste Management Act (MGL c.21C), as described below.

Solid Wastes

Massachusetts solid waste regulations are administered by the DEQE and specifically address the disposal of coal ash in a landfill (310CMR19.00). These regulations are currently undergoing review and revision with particular emphasis being placed on the coal ash portions of the regulations. An additional requirement affecting ash disposal is the site assignment process, whereby the city or town in which the disposal site is located must approve of the disposal plan. A public hearing is held as part of this process.

Boston Edison Company (BECO) is currently developing the ash management program for New Boston Station. The disposal plan will comply fully with the requirements and approvals mandated by Massachusetts solid waste regulations.

The solid waste regulations also address the landfill disposal of special wastes, including materials of a hazardous nature or materials requiring special procedures for handling and disposal [310CMR19.01(16)]. Disposal of special wastes in a sanitary landfill is allowable if such wastes are placed in a separate area designated for this purpose. All transport, storage, or disposal of wastes from New Boston Station would be performed by licensed contractors.

Hazardous Waste

The Massachusetts Hazardous Waste Management Act (MGL c.21C) regulates the generation, transport, storage, treatment, and disposal of hazardous wastes in Massachusetts. Regulations persuant to MGL c.21C (310CMR30.00) have recently been promulgated by the Massachusetts DEQE, prescribing in detail the requirements for hazardous waste generators, transporters, treatment, storage, and disposal facilities. The 310CMR30.00 regulations closely parallel the requirements under RCRA, and DEQE has received interim authority to administer the national hazardous waste management program in Massachusetts. Included in 310CMR30.00 is the exemption of fly ash and bottom ash from classification as hazardous wastes.

BECO will test postconversion period station wastes for hazardous characteristics. Possible hazardous wastes would either be treated in the station wastewater treatment facility and rendered nonhazardous, or shipped offsite for disposal. The transport and disposal of hazardous wastes would be in compliance with state regulations. The existing wastewater treatment system is designated an interim status hazardous waste treatment, storage, and disposal facility, and no additional permits are required as a result of the coal conversion.

3.2.4 Marine Environment

3.2.4.1 Chapter 91 Waterways License

For New Boston Station, a Chapter 91 Waterways License is required for the construction of structures seaward of the high tide line (MGL c.91 Sections 12-23 and 52-55). The permit is issued by the Division of Land and Water Use (Waterways) within DEQE and is not to be granted until a Wetlands Order of Conditions has been issued by the local Conservation Commission, Mayor, or Selectmen (see Section 3.3) and a Water Quality Certification has been issued by the DEQE. The Dredging and Disposal of Dredged Material Permit will be issued as part of the Waterways License.

3.2.4.2 Coastal Zone Management (CZM): Concurrence with Consistency Certification

The Coastal Zone Management Act of 1972 provided coastal states with the opportunity and funding to develop comprehensive management plans for their coastal regions. A Massachusetts CZM plan for utilization of coastal waters was developed as a result of the Act. Any project subject to formal review by MEPA which involves a federal action (including permitting) and which is located within or affects the Massachusetts coastal zone is subject to review for consistency with state coastal policy. Under these criteria, the New Boston Station coal conversion must apply for a consistency certification, as the project is subject to MEPA review, involves a federal (COE) permit, and affects the waterfront area of Reserved Channel, a portion of the Massachusetts coastal zone. The Massachusetts CZM Office reviews the consistency certification which indicates agreement with the CZM plan. The review process includes notification in the Environmental Monitor, a 21-day public comment period, and CZM office review of consistency with specific state plans, procedures, and policies. The consistency review is concluded when CZM issues its final "concurrence with" or "objection to" the applicant's certification of consistency. Approval of the consistency certification is required prior to COE issuance of the federal permits for work in navigable water and ocean disposal of dredged material and is also required prior to issuance of the modified or renewed discharge permit.

3.2.5 Massachusetts Environmental Policy Act (MEPA) Requirements

Under Massachusetts General Laws, Chapter 30, Section 62A, and Sections 10.04(1) and 10.04(9) of the Regulations Governing the Implementation of MEPA, the New Boston Station coal conversion requires the preparation of an Environmental Notification Form (ENF) and an EIR.

BECO submitted an ENF for the New Boston Station coal conversion project on October 14, 1982, and it was published in the Environmental Monitor on October 22, 1982. Scoping meetings were held on November 10, 1982, in the EOEA offices, and on November 22, 1982, in the Tynan Community School, South Boston. The Office of the Secretary of the EOEA issued the EIR scoping document on December 27, 1982. Following subsequent notification by BECO that dredging was required, the MEPA unit of EOEA issued additional requirements for the EIR which address dredging. Copies of both the ENF and the scoping documents are included in Section 1. This draft EIR has been prepared in accordance with the requirements set forth in the scoping document.

Under MEPA regulation (301CMR10.06), the draft EIR is reviewed for up to 30 days after notification of availability is published in the Environmental Monitor. Within 7 days of the end of the comment period, the Secretary of the EOEA must issue a statement on the adequacy of the draft EIR. The proponent (BECO) then prepares a final EIR, taking into account comments received on the draft, and the review and comment process is repeated. Again, within 7 days of the end of the comment period, the Secretary of the EOEA must issue a statement (certificate) on the adequacy of the final EIR. Final rulings on most required state permits must be made no later than 60 to 90 days after issuance of the notice of availability of the final EIR.

3.2.6 Department of Public Utilities (DPU)

BECO, as a regulated public utility, operates under the regulatory jurisdiction of the DPU. This jurisdiction includes supervision over retail rates for electricity, accounting, the issuance of bonds, capital stock and certain other securities, and investment in other entities. In undertaking a project of the magnitude of the proposed coal conversion of New Boston Station Units 1 and 2, BECO will require the approval of the DPU in order to raise the necessary capital to finance the project and to recover the investment in the project.

In 1980, Massachusetts enacted legislation which provides a method for Massachusetts electric utilities to finance coal conversion projects (MGL Chapter 164 Section 946 1/2). This legislation, known as the Oil Conservation Adjustment (OCA) is intended to provide incentive for electric utilities to convert oil facilities to coal. It allows electric companies to charge adjustments in rates between 66 and 100 percent of fuel cost savings over 7 or more years. The constraints within this method of recovery are: the electric company must demonstrate a substantial probability of savings; adjustment must not exceed fuel cost savings; and costs of expanding generating capacity are not allowed. However, the benefits are significant increases in customer savings, and immediate savings, unlike conventional recovery.

BECO believes that this concept can be effectively utilized to reduce the financial risk associated with coal conversion projects and accordingly reduce the capital costs of conversion. With an appropriate OCA Revenue Order from DPU, project financing could be accomplished utilizing a combination of pollution control bonds and intermediate debt instruments for each unit converted. This would result in 100 percent debt financing. In addition, customer savings will be enhanced during the recovery period due to the lower money costs. Proceeds from the OCA clause would be used to pay interest and retire the bonds over the period of conversion cost recovery. The capital expenditures and capitalized interest costs during construction will not be added to the rate base and, therefore, BECO would not make any profits from the conversion. In each year after conversion, the excess of OCA revenues collected over interest and tax payments will be used to retire the outstanding debt.

3.2.7 Reference

Department of Environmental Quality Engineering (DEQE). PSD Procedures, Attachment to Memorandum from the Office of General Counsel to PSD Work Group, DEQE. February 2, 1983.

TABLE 3.2-1

PARTICULATE EMISSION LIMITATIONS FOSSIL FUEL UTILIZATION FACILITIES

Facility Size (MBtu/hr)	Emission Limit (lb/MBtu)		
	New Facility	Existing Facility	Existing Facility (in Critical Area of Concern)[1]
3 to 250	0.1	0.15	0.12
>250	0.05[2]	0.15	0.12

NOTES:

1. Critical areas of concern include Boston and Everett.
2. 0.1 lb/MBtu is allowed if SO_2 is also reduced and provisions of 310CMR7.05 are satisfied.

TABLE 3.2-2

SIGNIFICANT AMBIENT AIR QUALITY IMPACTS
(ug/m^3)

Pollutant	Averaging Time				
	Annual	24-Hour	8-Hour	3-Hour	1-Hour
Sulfur dioxide	1	5	-	25	-
Particulates	1	5	-	-	-
Nitrogen dioxide	1	-	-	-	-
Carbon monoxide	-	-	500	-	2,000

TABLE 3.2-3

SIGNIFICANT AIR POLLUTANT EMISSIONS
(tons/year)

Pollutant	Emission Rate
Carbon monoxide	100
Nitrogen oxides	40
Sulfur dioxide	40
Particulate matter	25
Ozone	40
Lead	0.6

3.3 LOCAL REQUIREMENTS

Wetlands Protection Act - Order of Conditions

Pursuant to the Wetlands Protection Act (MGL c.131, Sec 40), a Wetlands Order of Conditions for the New Boston Station coal conversion project will be required of the Boston Conservation Commission. This Order of Conditions regulates the filling, dredging, or altering of land in or near water bodies (310CMR 10.00). Any order issued must contain conditions sufficient to preserve and promote the following public interests: the protection of public or private water supply and groundwater supply, the enhancement of flood control and storm damage prevention, the prevention of pollution, and the protection of fisheries and land containing shellfish. The Massachusetts Department of Environmental Quality Engineering (DEQE) is responsible for the adoption of regulations and procedures to be followed by the local conservation commissions, and is the appeal agency for local agency actions.

The Order of Conditions is based on a Notice of Intent which an applicant files for any activity within 100 feet of an area subject to the Act. Numerous activities related to the coal conversion will occur within 100 feet of the Reserved Channel 100-year floodplain, which is subject to the Act. These include construction of waterfront coal handling facilities, dredging to establish a berthing basin for coal delivery vessels, establishment of the reserve coal pile, and development of a public fishing pier.

SECTION 4

DESCRIPTION OF EXISTING FACILITY AND ENVIRONS

4.1 CHARACTERISTICS OF SITE

Boston Edison Company's (BECO) New Boston Station site comprises a 24.2-acre parcel of industrially zoned land along the southern bank of the Reserved Channel of Boston Harbor. To the west, the site is bounded by Summer Street, on the south by East First Street, and on the east by property owned by the Massachusetts Bay Transportation Authority (MBTA). The general location is presented in Figure 4.1-1. The station area is at an elevation of about 11 feet National Geodetic Vertical Datum (NGVD). New Boston Station includes two operating oil-fired power generating units and ancillary facilities, and two package boilers used for plant startup and heating steam, located in the retired L Street generating facility. The existing facilities are further described in Section 4.7. The Reserved Channel provides the cooling water to the station.

The area around New Boston Station is industrial and urban residential, and contains no natural areas. Other than a small landscaped plot at the entrance to the station, the only notable vegetation on the site is a 10-foot wide strip of black locust found between New Boston Station and the MBTA property.

The MBTA property to the east is also industrially zoned and contains a gas turbine facility, a switching station building, and a retired power station. BECO proposes to use an 11-acre parcel in the northern part of the MBTA property for coal storage and handling. The MBTA property is primarily black top or hard-packed soil with no notable vegetation.

An additional industrially zoned piece of vacant land, located northwest of the intersection of K and East First Streets, is also owned by BECO. This piece of land, referred to as the K Street property, consists of a parcel of land occupied by an outdoor electrical switching station, primarily used to transmit power generated by the New Boston Units, and two distinct vacant parcels of land occupying approximately 8.6 acres which would be used for construction parking and laydown for the proposed coal conversion. The first parcel, located nearest to East First Street, contains a considerable amount of rubble and a variety of construction and manufacturing debris. A variety of plant species adaptable to disturbed conditions are present. The second parcel, located northeast of the first, is presently leased to a contractor for use as a storage area. This area is hard-packed soil with little or no vegetation present. Both of these parcels border the western end of the Reserved Channel. Figure 4.1-1 shows the location of these parcels.

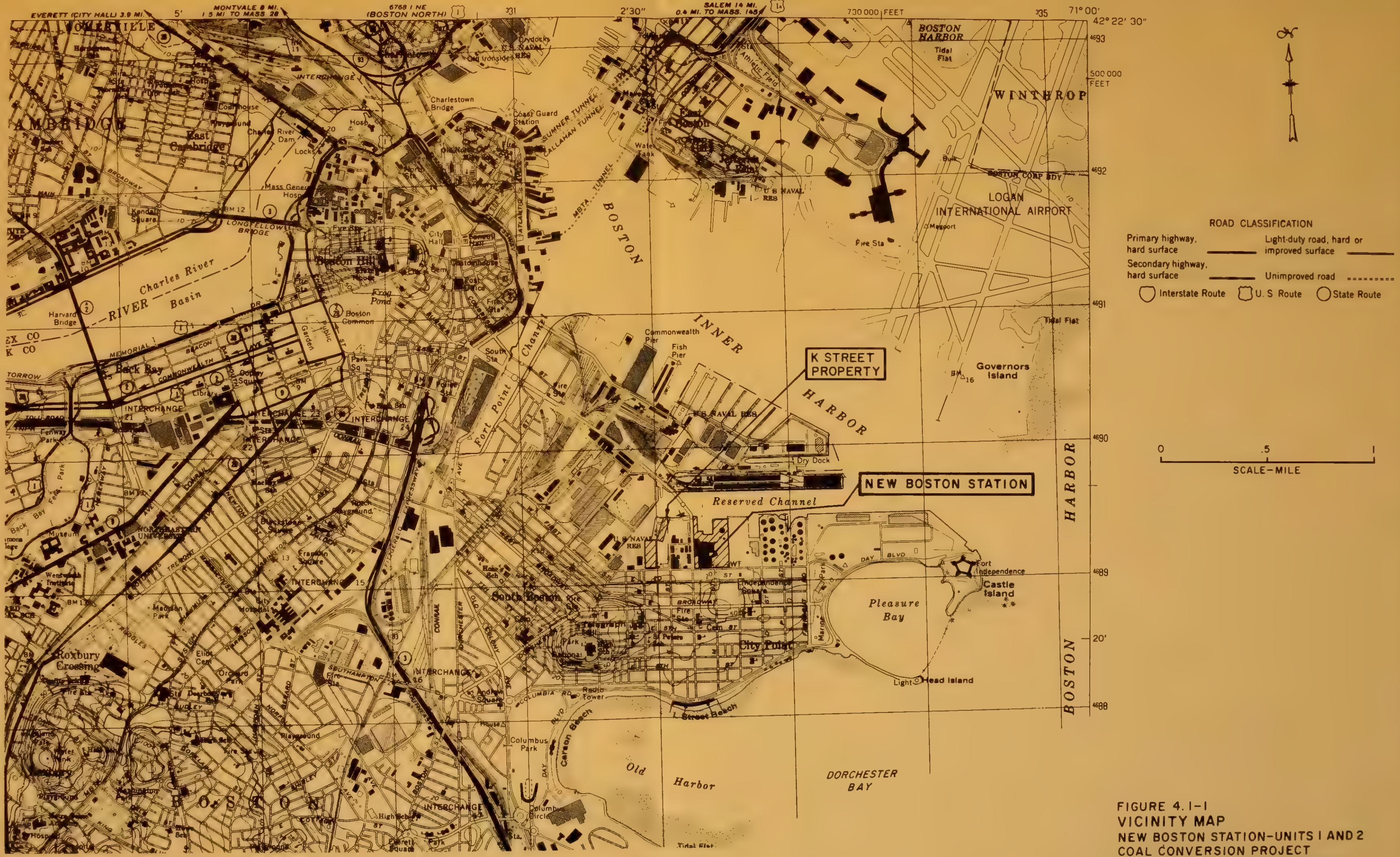


FIGURE 4.1-1
VICINITY MAP
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

4.2 DESCRIPTION OF ENVIRONS

4.2.1 Physiography, Topography, and Geology

New Boston Station and the adjacent Massachusetts Bay Transportation Authority (MBTA) property are located on the north side of a peninsula that is bordered on the north by the Reserved Channel, on the east by Boston Harbor, and on the south by Dorchester Bay (see Figure 4.2-1).

The ground surface on the peninsula slopes downward from the central portion of the peninsula to the surrounding water bodies. The highest land surface is the summit of Telegraph Hill, which has an elevation of approximately 135 feet [National Geodetic Vertical Datum of 1929 (NGVD)]. This point is approximately 3500 feet southwest of New Boston Station. The ground surface elevation along a north–south line extending through the station and along M Street rises from approximately 9 feet NGVD at the Reserved Channel to approximately 26 feet at East First Street. The land elevation continues rising to a maximum of approximately 62 feet NGVD at the southwest corner of Independence Square, 900 feet south of the station. South of Independence Square, the ground surface slopes downward to Dorchester Bay.

Most of the peninsula is composed of glacial deposits. Telegraph Hill is a drumlin, a streamlined hill composed of till which has been overridden and reshaped by glacial ice. The lower portions of the peninsula consist of till and outwash deposits, except for areas along the north shore. These areas were reclaimed from tidal flat and tidal marsh areas by progressive filling in a northward direction, most of which occurred during the 19th century, as shown in Figure 4.2-2.

A large portion of the present land at New Boston Station and the MBTA property is reclaimed land. Fill has been encountered in virtually all borings drilled at the sites, except those in unfilled channel and wharf areas. The fill ranges in thickness from 5 to 20 feet, with the greater thicknesses to the north where more fill had to be placed to raise the grade of former tidal and offshore areas. The fill contains gravelly sand, clay, coal, cinders, bricks, and wood (Geotechnical Engineers, Inc 1982).

Organic soils and peat underlie the fill at some locations in the central and northern portions of the Boston Edison Company (BECO) and MBTA properties. These are underlain by complexly stratified layers of gravelly sand, silt, and clay which represent interlayering of glacial outwash deposits with marine sediments. The thickness of the stratified sand, silt, and clay ranges from approximately 53 to 110 feet. These soils are underlain by approximately 2 to 26 feet of dense glacial till, followed by argillite (claystone) bedrock. The bedrock surface increases in elevation toward the north and west. In the south-central portion of the MBTA site, bedrock is encountered at an elevation of approximately -122 feet NGVD. Along the north side of the abandoned MBTA pier, adjacent to the Reserved Channel, the elevation of bedrock ranges from approximately -89 feet NGVD at the east end to -67 feet NGVD at the west end (SWEC 1983).

4.2.2 Land Use and Water Use

4.2.2.1 Land Use - Site Vicinity

The City of Boston is divided into three major zoning district classifications: residential, business, and industrial. Specific descriptions of land uses within these districts are identified by class subdivisions. Table 4.2-1 summarizes South Boston's land uses. Three classes exist for the residential district: single family, general residence consisting of two and three family dwellings, and apartment residences. Two classes comprise the business district: local retail and service stores, and general retail businesses and offices. The industrial district is subdivided into three classes: light manufacturing, general manufacturing, and waterfront industry. Land use within each of these districts and classes is regulated by a set of zoning bylaws, Boston Zoning Code and Enabling Act, which was adopted by the City in 1956 and amended in 1981 (City of Boston 1981).

Figure 4.2-1 presents the site vicinity. South Boston encompasses a peninsula of land of approximately 2403 acres or 3.75 square miles. Approximately 43 percent of the total land area, 1036 acres, is comprised of filled land. From the years of 1836 to 1901, three separate areas of filled land were added to South Boston. Figure 4.2-2 outlines the South Boston land-filled areas which are a mixture of residential and industrial land uses.

Current land use in South Boston is predominately divided into two zones: a residential zone occupying approximately one-third of the total area, and an industrial zone occupying the remaining two-thirds of South Boston. First Street to the north, and Old Colony and Dorchester Avenues to the west, serve as the general dividing line between the two uses. The residential community is located south of First Street and east of Old Colony and Dorchester Avenues, an area of approximately 1.7 square miles. The land area of residential use has remained relatively constant over the past few decades.

Industrial uses are found north of First Street along the waterfront and along Dorchester Avenue. In recent years, industry has been locating south of First Street within the residential neighborhoods. Industrial uses intermingled with residential areas are evident along First Street, West Second

Street, West Third Street, A Street, B Street, and Old Colony Avenue. A moratorium on zoning changes is inhibiting the further location of industry in residential areas. Major industrial activities, located north of First Street, include manufacturing, shipping, warehousing, construction equipment storage, trucking, and light industry. Approximately 35 percent of the land within this industrial area is vacant (Boston Redevelopment Authority 1979).

Business, local retail and service stores, and offices are concentrated along Broadway between G and L Streets. Most are occupied with small stores and service shops (Boston Redevelopment Authority 1979, J.M. Cortell & Assoc 1980).

South Boston has several parcels of recreational land located within residentially zoned areas. Carson Beach is located approximately 0.8 miles southwest of New Boston Station along the Old Harbor. Columbus Park, the largest recreational area in South Boston, is located approximately 1 mile southwest of the station. Castle Island, Marine Park and Skating Rink, and L Street Beach are three additional waterfront recreational areas in South Boston. Thomas Park, Independence Square, the Christopher J. Lee Playground, B & West Third Street Playground, Father Buckley Playground, and Sweeney Playground are neighborhood parks located in residential areas. The Christopher J. Lee Playground is located across East First Street from the station. The playground has a play area for young children as well as several sports facilities. There are approximately 12 school playgrounds and 3 small municipal parks in South Boston.

4.2.2.2 Land Use - Onsite

The New Boston Station is west of MBTA property that is also industrially zoned and used as a power plant site. The New Boston Station includes two operating oil-fired generating units and ancillary facilities, and a retired generating facility. As stated in Section 4.1, two distinct parcels of land occupying approximately 8.6 acres of vacant land are located on the K Street property. This area is industrially zoned and is intended for construction parking and laydown for the proposed coal conversion.

4.2.2.3 Water Use

As shown in Figure 4.2-1, New Boston Station is accessible by boat and barge via the Reserved Channel of Boston Harbor. The Reserved Channel, which borders the station to the north, is a designated port area. The maintained channel is approximately 430 feet wide and is navigable for small craft, barges, and tankers from the outer harbor to the Summer Street bridge. The Reserved Channel is approximately 1500 feet west of the main ship channel entering Boston Harbor. The channel's west end terminates at Industrial Park Drive in the Boston Harbor Industrial Park, west of the Summer Street Bridge over the Reserved Channel. This is a retractable bridge with horizontal clearance of 39 feet and vertical clearance of 6 feet. The present controlling depth of the maintained channel is approximately 32 feet below mean low water (EG&G Environmental Consultants 1982).

The 1980 total commerce vessel traffic counts for the entire port of Boston are itemized in Table 4.2-2. The principal destinations for vessels entering the Reserved Channel would include the Texaco tank farm (White Fuel Company), the Conley Marine Terminal at Castle Island, Sea-Land Services, and the U.S. Army Base. Currently, no barge deliveries are made to New Boston Station. However, a barge slip exists at the station. In 1983 approximately 120 vessels entered the Reserved Channel bound for Conley Marine Terminal at Castle Island, Texaco, or Sea-Land Services. This total represents an average of 2.3 vessels per week (Halligan 1983).

4.2.3 References

Boston Redevelopment Authority. South Boston District Profile and Proposed 1979-1981 Neighborhood Improvement Program. 1979.

City of Boston. Boston Zoning Code and Enabling Act, amended 1981.

EG&G Environmental Consultants. Reserved Channel Bathymetric Survey. November 1982.

Geotechnical Engineers, Inc. 1982 Summary of Subsurface Conditions at New Boston Station and Adjacent MBTA Power Plant Property, South Boston, Massachusetts. Prepared for Boston Edison Co. 1982.

Halligan, Joseph. Assistant Manager, Conley Marine Terminal, Boston, Massachusetts and Ellis, C. Stone & Webster Engineering Corporation. Personal Communication, March 22 and March 29, 1983.

J. M. Cortell & Associates. Seaport Development, Boston Marine Industrial Park: Final Environmental Impact Report. 1980.

Stone & Webster Engineering Corporation. Report on Subsurface Investigation for Preliminary Engineering, New Boston Station, Units 1 and 2 Coal Conversion; Boston, Massachusetts. Prepared for Boston Edison Company. 1983.

TABLE 4.2-1

SOUTH BOSTON LAND USE BY ZONE

Use	Zone A Northern Industrial Area-Acres	Zone B Dorchester Avenue Industrial Area-Acres	Zone C Residential Area-Acres	Total	% of Total
Industrial/ Commercial	507.4	100.4	12.4	620.2	48
Residential	8.5	49.1	345.0	402.6	31
Vacant	269.3	8.5	5.0	282.8	21
Total Net Without Streets	785.2	158.0	362.4	1305.6	100

SOURCE:

Fay, Spofford, & Thorndike, Inc and Wallace, Floyd, Ellenzweig, Moore, Inc. Seaport Access System, South Boston - Preliminary Environmental Assessment. June 1980.

TABLE 4.2-2

BOSTON HARBOR COMMERCE VESSEL TRAFFIC, 1980

	Inbound	Outbound
Self-Propelled Vessels:		
Passenger & dry cargo	4932	4914
Tanks	999	1029
Towboat or tugboat	1358	1434
Non-Self-Propelled Vessels:		
Dry cargo	52	50
Tanks	835	808
Total	8176	8235

SOURCE:

U.S. Army Corps of Engineers. Waterborne Commerce of the United States, 1980, Part I.

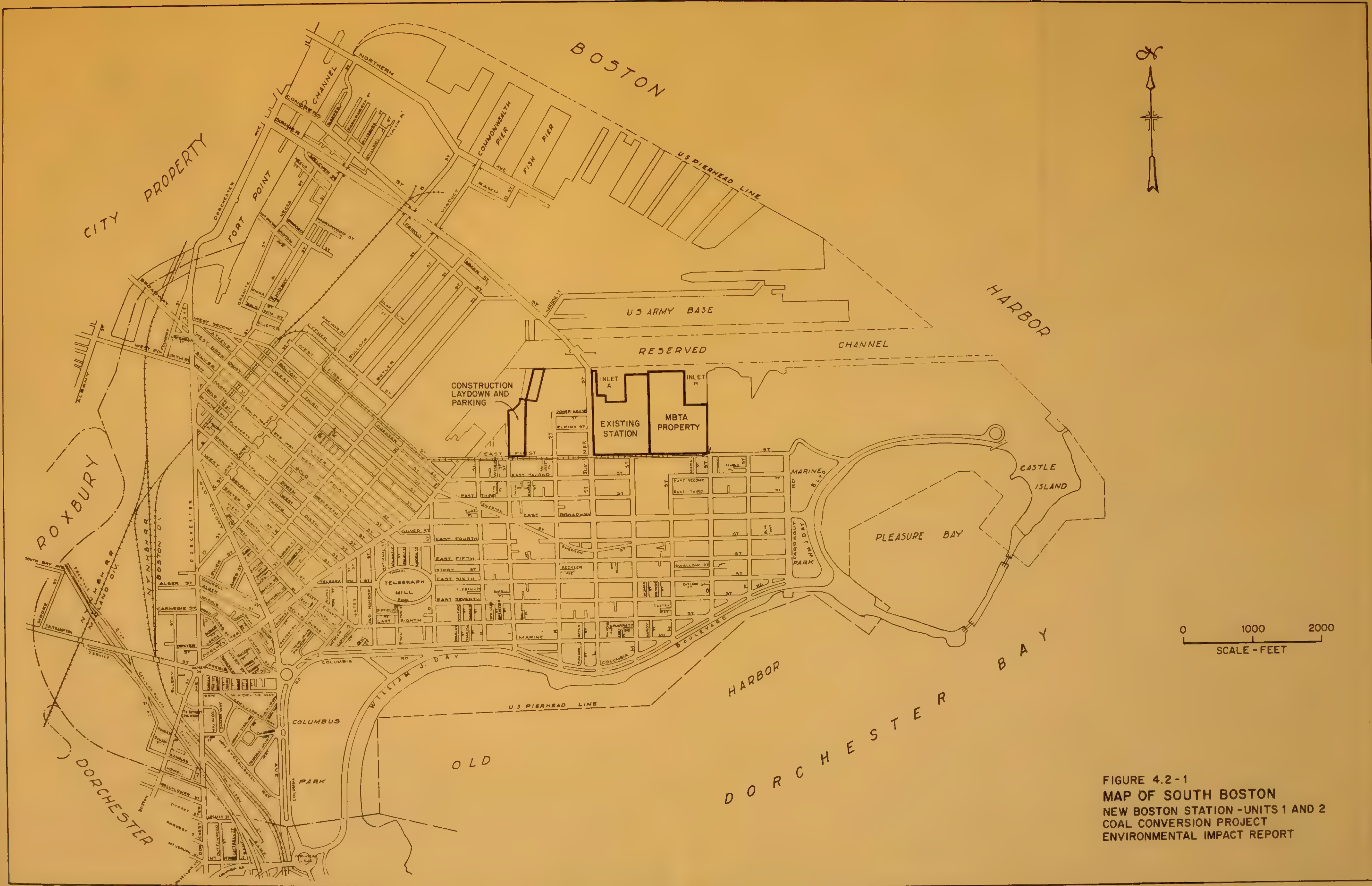


FIGURE 4.2-1
MAP OF SOUTH BOSTON
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

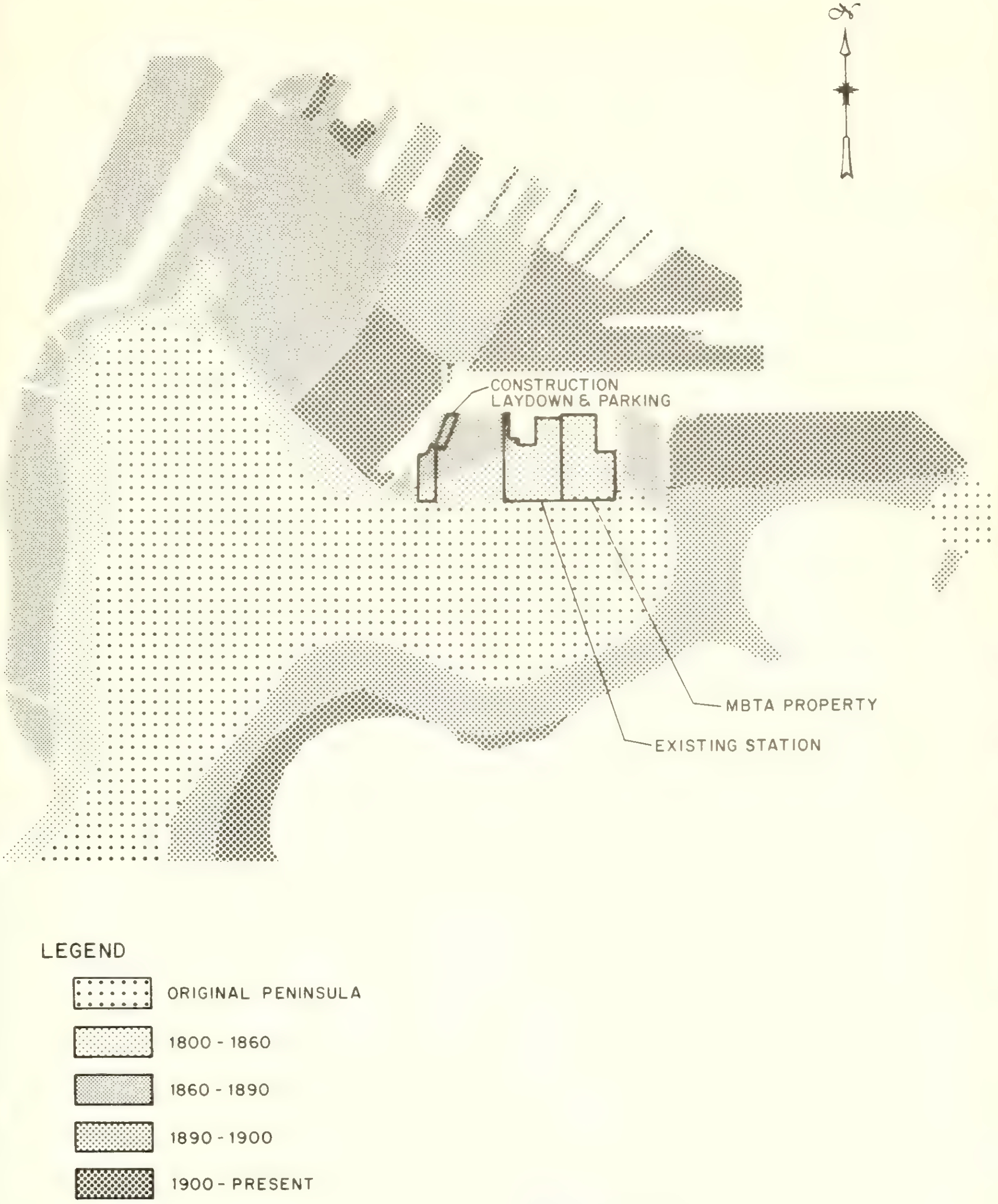


FIGURE 4.2-2
LANDFILL HISTORY OF
SOUTH BOSTON
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

4.3 POPULATION AND SENSITIVE RECEPTORS

The U.S. Bureau of the Census reported that South Boston's population decreased 19.5 percent, from 38,896 in 1970 to 31,311 in 1980. This rate of decrease is 7.8 percent greater than the 11.7 percent rate of decrease for the remainder of the City of Boston (U.S. Department of Commerce 1980). Households of one to three people in size constitute 81 percent of all households in South Boston. Table 4.3-1 provides a percent distribution of household size for 1980.

Table 4.3-2 lists estimated 1980 population distribution by 500-foot intervals within approximately 1 mile of New Boston Station. Figure 4.3-1 shows the estimated 1980 population distribution in South Boston. South Boston is the only community located within 1 mile of the New Boston Station. The area within 500 feet of a point at the center of the generating units of the station is entirely industrial or water and, therefore, no residential population is found. Over 80 percent of South Boston's population is located within the 5500-foot study area. Approximately 70 percent of the population within the study area resides beyond 2000 feet from the station center.

Sector populations were determined by assuming that the population of a census tract is evenly distributed over its geographic area. The proportion of each census tract's area in each grid sector was determined and applied to each census tract's total population, yielding the population in each grid sector.

Forty-one sensitive receptors are located within the South Boston neighborhood. Schools, recreation areas, elderly housing developments, cultural/historic sites, nursing homes, and community health centers constitute these sensitive receptors. Table 4.3-3 and Figure 4.3-2 identify and locate sensitive receptors in South Boston.

References

U.S. Department of Commerce, Bureau of the Census. Massachusetts General Population Characteristics. Tables P-1 and H-1. 1980.

TABLE 4.3-1

PERCENT DISTRIBUTION OF SOUTH BOSTON HOUSEHOLDS BY SIZE, 1980

Number of People	Percent
1	34
2	31
3	16
4	5
5	5
6	5
7	4
8 or greater	0
TOTAL	100

SOURCE:

Boston Redevelopment Authority. Boston and Its Neighborhood. May 1982.

TABLE 4.3-2

POPULATION DISTRIBUTION WITHIN 5500 FEET OF NEW BOSTON STATION

	Distance (in feet)											
Direction	0-500	500-1000	1000-1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	4000-4500	4500-5000	5000-5500	Total
N	I,W	I,W	M,W	M	M	I	I,W	I,W	I,W	I,W	W	0
NNE	I,W	I,W	M,W	M	M	I,W	I,W	I,W	W	W	W	0
NE	I,W	I,W	I,W	M,W	M,W	I,W	I,W	I,W	I,W	W	W	0
ENE	I	I	I,W	I,W	I,W	M,W	M,W	M,W	W	W	W	0
E	I	I	I,W	I,W	I,W	I	I	I,W	I,W	I,W	I,W	0
ESE	I	I	58	240	507	532	32	R,W	R,W	R,W	R,W	1369
SE	I	54	195	262	604	699	564	R,W	R,W	R,W	R,W	2378
SSE	I	82	154	424	400	695	484	R,W	W	W	W	2239
S	I	104	215	433	549	711	847	45	W	W	W	2904
SSW	I	73	166	387	545	757	817	193	R,W	W	W	2938
SW	I	93	175	258	476	733	1052	1102	1064	925	648	6526
WSW	I	I	54	159	263	432	640	921	798	854	786	4907
W	I	I,W	I,W	M,W	M,W	14	108	211	430	718	855	2336
WNW	I,W	I,W	I,W	M,W	M	96	153	87	31	35	45	447
NW	I,W	I,W	I,W	M,W	M	95	112	93	97	126	150	673
NNW	I,W	I,W	M,W	M,W	M	I	I	17	39	37	36	129
Total	0	406	1017	2163	3344	4764	4809	2669	2459	2695	2520	26,846

NOTE:

I=Industry
W=Water
R=Recreation Area
M=Military Base

TABLE 4.3-3

SENSITIVE RECEPTORS IN SOUTH BOSTON

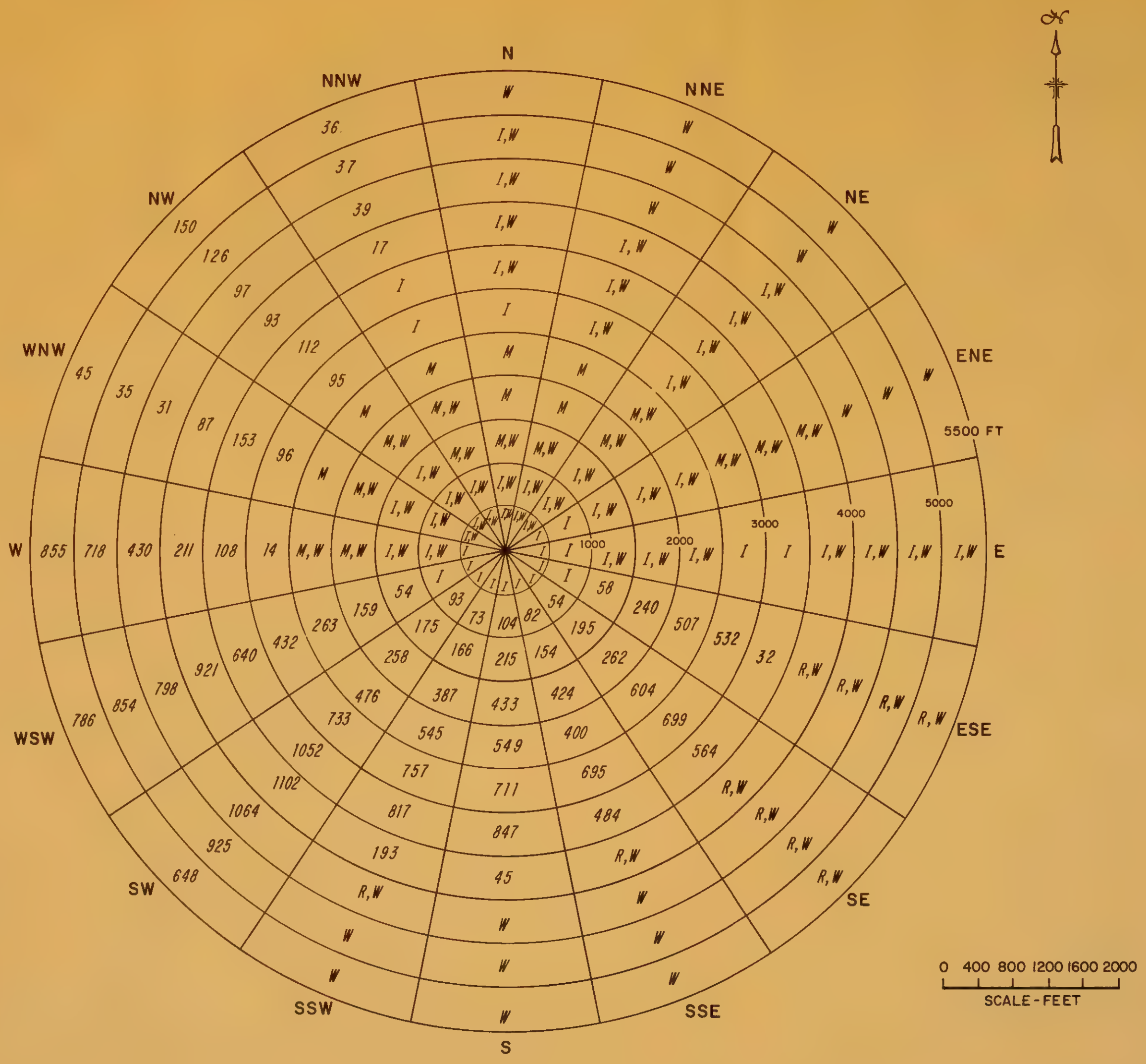
Map Code	Identification	Location-Address	Qualifying Criteria
1	South Boston High School	95 G Street	School-public
2	Patrick F. Gavin Middle School	215 Dorchester Street	School-public
3	Condon Elementary School	200 D Street	School-public
4	Joseph Tynan Elementary School	650 East Fourth Street	School-public
5	Michael J. Perkins Elementary School	50 Burke Street	School-public
6	H. O. Perry Elementary School	745 East Seventh Street	School-public
7	St. Augustine's School	207 E Street	School-parochial
8	St. Brigid's School	866 East Broadway	School-parochial
9	St. Peter's School	518 East Sixth Street 492 East Seventh Street	School-parochial
10	Cardinal Cushing Central High School	50 West Broadway	School-parochial
11	Gate of Heaven School	609 East Fourth Street	School-parochial
12	South Boston Heights Academy	486 East Third Street	School-private
13	South Boston Branch, Boston Public Libary	646 East Broadway	
14	Christopher Lee Playground	East First & M Street	Recreational area
15	Independence Square	East Broadway & M Street	Recreational area
16	Marine Park	Farragut Road	Recreational area
17	Aquarium Skating Rink	W J Day Boulevard	Recreational area
18	L Street Beach and Bath House	1663 Columbia Road	Recreational area
19	Carson Beach	W. J. Day Boulevard	Recreational area
20	Columbus Park	Columbia Road	Recreational area
21	Castle Island	W. J. Day Boulevard	Recreational area
22	Thomas Park	G Street	Recreational area

TABLE 4.3-3 (Cont)

Map Code	Identification	Location-Address	Qualifying Cirteria
23	B & West Third Street Playground	B & West Third Street	Recreational area
24	Father Buckley Playground	West Second & Bolton Streets	Recreational area
25	Sweeney Playground	West Fourth & D Streets	Recreational area
26	Foley Apartments, Elderly Housing	199 H Street	Elderly housing development
27	Monsignor Powers Elderly Housing	L & East Sixth Streets	Elderly housing development
28	Children's Museum	300 Congress Street	Cultural resource
29	Boston Tea Party Ship and Museum	Congress Street Bridge	Cultural resource
30	Harrison Loring House	789 East Broadway	Historical landmark-Boston Landmark Commission
31	Dorchester Heights National Historic Site	G Street	Historic site - National Register of Historic Places
32	Fort Independence National Historic Site at Castle Island	Castle Island	Historic site - National Register of Historic Places
33	Vietnam War Memorial at Independence Square	East Broadway & M Street	South Boston cultural landmark
34	Commonwealth Pier Exhibition Hall	Northern Avenue	Public Exhibition Hall
35	Bayside Nursing Home	304 East Seventh Street	Nursing home
36	Harborview Nursing Home, Inc	1380 Columbia Road	Nursing home
37	Marian Manor Nursing Home	130 Dorchester Street	Nursing home
38	South Boston Community Health Center	133 Dorchester Street	Community Health Center
39	Laboure Center, Inc	371 West Fourth Street	Community Health Center
40	Rosengard Clinic	380 West Broadway	Community Health Center
41	West Broadway Unit	62 Joyce-Hayes Way	Community Health Center

NOTE:

See Figure 4.3-2 for locations of sensitive receptors.



TOTALS:

0- 500(FT) = 0
500-1000(FT) = 406
1000-1500(FT) = 1017
1500-2000(FT) = 2163
2000-2500(FT) = 3344
2500-3000(FT) = 4764
3000-3500(FT) = 4809
3500-4000(FT) = 2669
4000-4500(FT) = 2459
4500-5000(FT) = 2695
5000-5500(FT) = 2520

NOTE:

R = RECREATION AREA
I = INDUSTRY
M = MILITARY
W = WATER

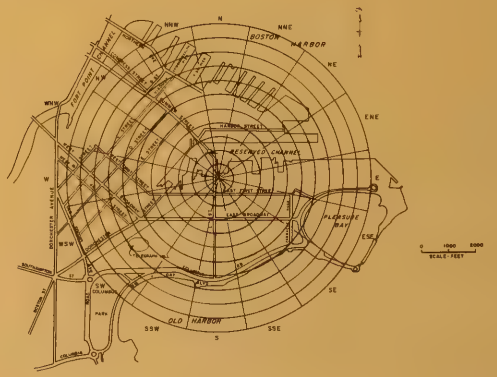
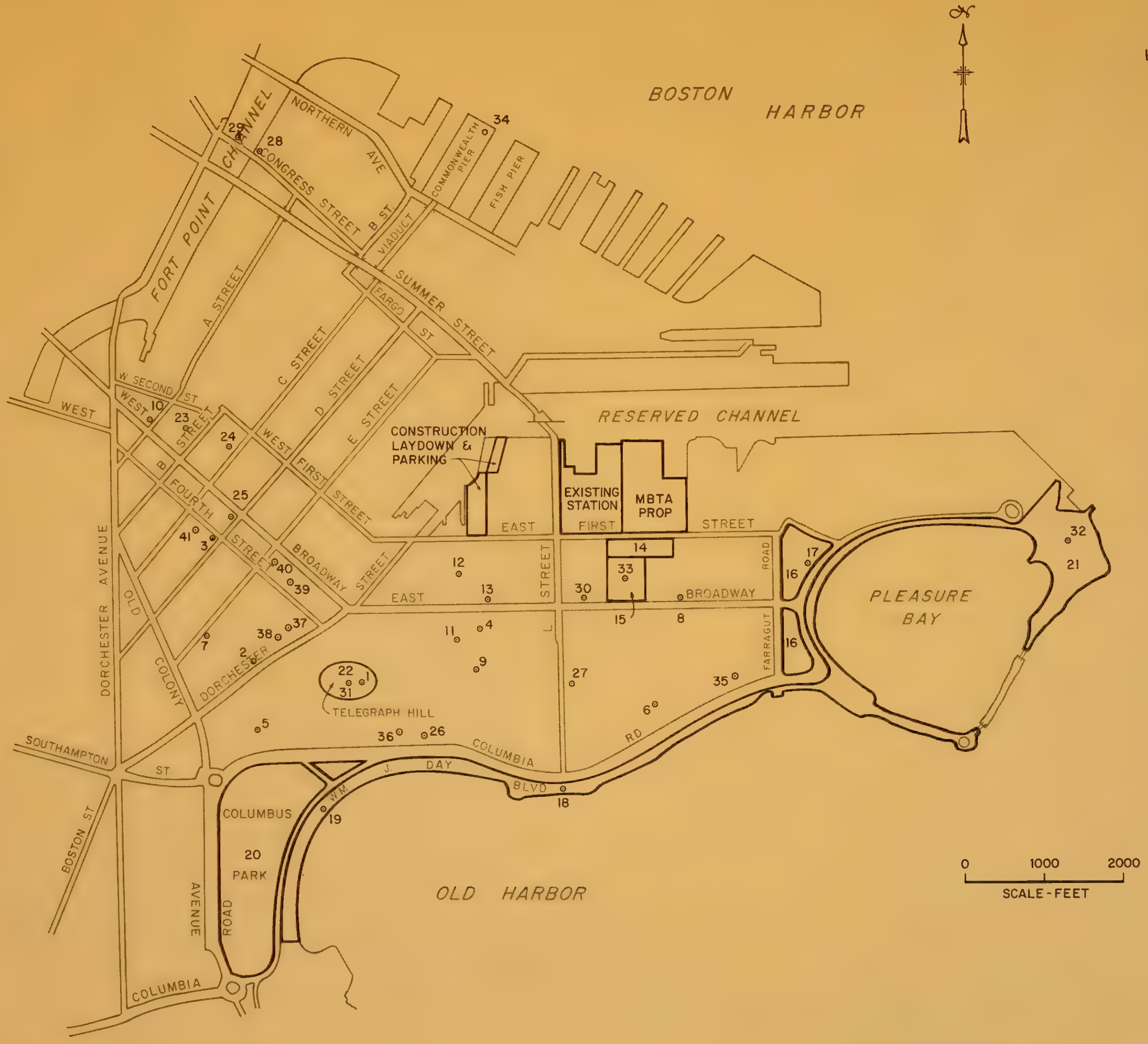


FIGURE 4.3-1
POPULATION DISTRIBUTION
OF SOUTH BOSTON
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



LEGEND
1. SOUTH BOSTON HIGH SCHOOL
2. PATRICK GAVIN MIDDLE SCHOOL
3. CONDON ELEMENTARY SCHOOL
4. JOSEPH TYNAN ELEMENTARY SCHOOL
5. MICHAEL J. PERKINS ELEMENTARY SCHOOL
6. H.O. PERRY ELEMENTARY SCHOOL
7. ST. AUGUSTINE'S SCHOOL
8. ST. BRIGID'S SCHOOL
9. ST. PETERS SCHOOL
10. CARDINAL CUSHING CENTRAL HIGH SCHOOL
11. GATE OF HEAVEN SCHOOL
12. SOUTH BOSTON HEIGHTS ACADEMY
13. SOUTH BOSTON BRANCH, BOSTON PUBLIC LIBRARY
14. CHRISTOPHER LEE PLAYGROUND
15. INDEPENDENCE SQUARE
16. MARINE PARK
17. AQUARIUM SKATING RINK
18. L STREET BEACH AND BATH HOUSE
19. CARSON BEACH
20. COLUMBUS PARK
21. CASTLE ISLAND
22. THOMAS PARK
23. B & WEST THIRD STREETS PLAYGROUND
24. FATHER BUCKLEY PLAYGROUND
25. SWEENEY PLAYGROUND
26. FOLEY APARTMENTS
27. MONSIGNOR POWERS ELDERLY HOUSING
28. CHILDREN'S MUSEUM
29. BOSTON TEA PARTY SHIP & MUSEUM
30. HARRISON LORING HOUSE
31. DORCHESTER HEIGHTS NATIONAL HISTORIC SITE
32. FORT INDEPENDENCE NATIONAL HISTORIC SITE AT CASTLE ISLAND
33. VIETNAM WAR MEMORIAL AT INDEPENDENCE SQUARE
34. COMMONWEALTH PIER EXHIBITION HALL
35. BAYSIDE NURSING HOME
36. HARBORVIEW NURSING HOME, INC.
37. MARIAN MANOR NURSING HOME
38. SOUTH BOSTON COMMUNITY HEALTH CENTER
39. LABOURE CENTER, INC.
40. ROSENGARD CLINIC
41. WEST BROADWAY UNIT

FIGURE 4.3-2
SENSITIVE RECEPTORS
IN SOUTH BOSTON
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

4.4 SOCIOECONOMICS

4.4.1 Transportation

4.4.1.1 Road System

Access to New Boston Station is comprised of primary arterial roads and local roads in the immediate vicinity of the station. East First Street provides direct access to the site. To the west, East First Street converges with Summer Street to the north and L Street to the south at a signalized intersection. This intersection represents a key traffic convergence and approach to the station. To the east of the station, East First Street is connected with Farragut Road and William J. Day Boulevard, which serve as major transportation links. The station is connected to South Boston center by a network of local feeder streets. East First Street is a two-lane primary arterial route serving as a major east-west connection. Its road surface width is approximately 30 feet, which includes a 2-foot tar shoulder on either side. The lanes are approximately 13 feet wide and no lane has a passing option. The posted speed limit is 30 miles per hour, but the observed speed is somewhat slower, primarily due to intermittent traffic congestion.

Table 4.4-1 presents a summary of existing levels of service for major South Boston intersections. Certain intersections in South Boston are congested, particularly in the industrial areas. However, traffic in the vicinity of the station experiences only sporadic delays. Restricted capacity bridge connections to the regional transportation network and major highways, narrow roadway intersections, and significant truck travel contribute to traffic congestion (J.M. Cortell & Assoc 1980). Access to highways in the south and west, specifically the Southeast Expressway, from the industrial areas north of First and Second Streets is difficult due to narrow intersections and restricted bridge capacities. Figure 4.4-1 identifies the regional highway network.

South Boston's northern industrial section, which includes New Boston Station, has connections to the Central Artery which, in turn, connects to the regional highway networks to the north, west, and south. To the north, the Northeast Expressway (Route 1) and Interstate 95, Interstate 93, the Tobin Bridge, and the Sumner and Callahan Tunnels are all accessible via the Central Artery and local surface streets. To the west, the Massachusetts Turnpike is accessible via the Central Artery, the Broadway Bridge, Summer Street Bridge, or West Fourth Street Bridge. Presently, traffic flow on the Summer Street Bridge over Reserved Channel is temporarily limited to southbound traffic. Regional access to the south from South Boston is provided by the Southeast Expressway, which can be reached via the Central Artery or directly by exiting South Boston from one of the roadways on its southern border.

There are 10 access routes to South Boston from the regional road network. Eight of these access routes require passing over bridges that cross either the Fort Point Channel or the Conrail, MBTA, or Amtrak railroad tracks. Summer Street, Broadway, and Columbia Road bridges are the major entrance/exit routes to South Boston with daily traffic volumes in excess of 20,000 vehicles per day (Fay et al 1980). Of the 10 access points, all but Columbia Road and Day Boulevard serve as access points for trucks. Figure 4.4-2 presents access points to South Boston.

A designated truck route for South Boston was established by the Boston City Traffic and Parking Department in order to prohibit truck traffic in residential neighborhoods. Figure 4.4-3 shows the location and direction of traffic flow of the roadway segments comprising the existing truck route. All streets north of First Street allow truck traffic. However, south of First Street, truck restrictions apply. The designated truck route includes Dorchester Avenue, A Street, Broadway, C Street, East and West First Streets, and portions of West Second Street (Fay et al 1980). A more detailed discussion of traffic conditions, particularly related to truck traffic, is presented in Appendix E.

4.4.1.2 Rail System

Local rail access to South Boston is provided by the South Boston Industrial branch, operated by Conrail and owned by Massport. This track is presently in use, at a level of service of five nights per week. Service is inbound freight only and does not extend east of Summer Street. The railspur for New Boston Station has been removed.

4.4.2 Traffic Conditions

4.4.2.1 Road System

Existing traffic-demand volumes of both passenger cars and trucks at the intersection of East First Street and Summer Street were inventoried by Traffic Control Systems of Brighton, Massachusetts, on September 23, 1980. The weather on this day was clear and dry. All turning movements were counted for 30-minute intervals over an 11-hour period, from 7 am to 6 pm. The results of this survey are shown in Table 4.4-2 and Figure 4.4-4. Daily traffic flows at this intersection remain relatively constant from 8:30 am to 3:00 pm; however, volume increases in the rush-hour intervals, from 7:30 am to 8:30 am and from 3:30 pm to 5:30 pm. The 1979 average daily traffic volumes for roadways throughout South Boston are shown in Figure 4.4-5.

A truck origin/destination survey, conducted in 1976, identifies the nature of truck trips in South Boston (Fay et al 1980). Table 4.4-3 presents the results of this survey. The average total number of weekday truck trips was 9364. Over 70 percent of this total originated in the industrial zone, north of East First Street and east of the Fort Point Channel. The origin/destination survey revealed a fairly even distribution of trucks bound for South Boston from throughout the Boston Metropolitan region (Fay et al 1980). The most heavily traveled major roadways to South Boston are Interstate Route 93 from the north, the Southeast Expressway from the south, and the Massachusetts Turnpike from the west. Figure 4.4-6 presents daily truck volumes along segments of the designated truck route.

4.4.2.2 Traffic Safety

The number of reported motor vehicle accidents in South Boston for recent years is not available. Refer to Section 8.2 for a discussion of traffic accidents in South Boston.

4.4.3 Labor

4.4.3.1 Offsite

South Boston and Boston City's labor force participation rates equaled 59 percent and 62 percent, respectively, in the spring of 1980 (BRA 1982b). According to BRA labor statistics, the unemployment rate for South Boston in the spring of 1980 totaled 7 percent. For that same period, the City of Boston's unemployment rate equaled 5.7 percent; and for the entire year of 1980, the City's unemployment rate equaled 6.1 percent.

A percent distribution of employment by industry of South Boston compared to that of Boston's labor force in 1980 and 1981 is provided in Table 4.4-4. Secondary employment concentrated in manufacturing, tertiary employment comprised predominantly of service jobs, and government employment combine to account for 67 percent of South Boston's 1980 employment. Location of employment for South Boston workers is primarily within the South Boston - Boston City area. Table 4.4-5 presents the location of the places of work for South Boston's employed work force.

Table 4.4-6 presents percent distributions of occupations of South Boston's employed workers for 1970 and 1980.

As indicated, clerical and service workers dominate the community's employment pattern. In decreasing order, craftsmen, operatives, and professional-managerial-technical workers are the next most common job categories. Trends in South Boston's occupational structure between 1970 and 1980 indicate a general decline in the percentage of operatives, sales workers, and professional-managerial-technical workers, with offsetting increases in the proportion of craftsmen and service workers.

Manufacturing represents the major source of income and employment in South Boston. In 1980, 243 manufacturing firms located in South Boston employed 11,144 persons (J.M. Cortell and Assoc 1980; Boston Redevelopment Authority 1982a). Approximately 68 percent of this total manufacturing employment is accounted for by printing and publishing, fabricated metals, food processing, and apparel operations. There was a 17 percent drop in total manufacturing jobs between 1965 and 1977 in South Boston. Much of this decrease may be attributed to the closing of naval operations at the South Boston Naval Annex. However, South Boston's 17 percent decline in manufacturing jobs was significantly less than the city-wide drop of 43 percent for the same period (J.M. Cortell and Assoc 1980).

Major sources of income for South Boston residents include wages and salaries, and government transfer payments. Table 4.4-7 presents 1979 percent distribution of South Boston's population by largest source of income. Finally, Table 4.4-8 provides percent distribution of South Boston residents by income level. The 1979 median annual income for South Boston residents equaled $7300 for individuals and $9450 for families. However, over 75 percent of individuals and over 60 percent of families in South Boston earn up to $15,000 annually.

4.4.3.2 Onsite

Boston Edison Company (BECO) employs 112 workers in three shifts at New Boston Station. The majority of the work force is from the Boston Metropolitan area. The average commuting distance for these employees is approximately 12 miles.

4.4.4 Economics

Since South Boston is a neighborhood of Boston, major sources of revenue for South Boston are derived directly from the City of Boston. Sources of revenue for the City of Boston include state aid, federal aid, personal and real estate property taxes, and vehicle excise taxes and user fees. Boston's major expenditures include employee salaries, buildings, equipment, maintenance, social programs, and development projects. The 1982 tax rate was $230.90 per $1000 of assessed value. The assessed value was based on a percentage of fair market value. Total property valuations for the City of Boston for fiscal 1981 equaled $1,636,587,000. Total taxes levied for fiscal 1981 equaled approximately $446,297,270. Proposed changes to the tax structure include a $20.50 residential rate per $1000 of assessed value, based on a 100-percent valuation, and a $37.50 commercial/industrial rate per $1000 of assessed value, based on a 100-percent valuation (Heavne 1982).

During the period from 1970 to 1980, the City of Boston invested approximately $30,000,000 in capital facilities in South Boston, including the construction of the Condon and Tynan Community Schools and the D Street Fire Station (Boston Redevelopment Authority 1979).

4.4.5 Public Facilities and Services

4.4.5.1 Recreation

Several open space and recreational facilities serve South Boston residents. The major facilities are ocean oriented. These are Carson Beach, L Street Beach, and Marine Park on Pleasure Bay. These facilities support swimming, boating, and fishing activities. Additionally, there are a number of smaller parks and playing fields, usually associated with schools which are scattered through the South Boston community. South Boston's recreational facilities are further identified in Table 4.3-3 and shown on Figure 4.3-2.

4.4.5.2 Education

Both public and parochial schools serve the educational needs of South Boston students. Six public schools – four elementary schools, one middle school, and one high school - and five parochial schools provide adequate capacity for projected enrollments. South Boston's schools are further identified in Table 4.3-3 and shown in Figure 4.3-2.

4.4.5.3 Police and Fire Protection

Police and fire protection are provided by the City of Boston at locations in South Boston. The District 6 Police Station, located on Dorchester Avenue, serves South Boston residents. Two fire stations, located on D Street and K Street, provide fire protection to the South Boston community.

4.4.5.4 Health Services

Health services in South Boston include five community clinics: The South Boston Community Health Center, Laboure Center, Rosengard Clinic, Tufts - West Broadway Unit (or D Street Clinic), and Mary Ellen McCormack Health Center. In addition to these clinics, three nursing homes, Bayside Nursing Home, Harborview Nursing Home, and Marian Manor Nursing Home, exist in South Boston (Boston Redevelopment Authority 1979). South Boston's health services and nursing homes are further identified in Table 4.3-3 and shown in Figure 4.3-2.

4.4.5.5 Utilities

South Boston is adequately served by several utility systems. These include the following:

- A solid waste disposal provided by both the City of Boston and private contractors using approved disposal sites
- A sewage and storm drain system discharging to the City of Boston's system which in turn carries sewage to the Metropolitan District Commission (MDC) treatment facilities
- Water supply from the City of Boston
- Natural gas provided by Boston Gas Company
- Telephone services provided by New England Telephone Company
- Electric power provided by BECO

4.4.6 Housing

The majority of housing in South Boston is comprised of multi-family, year-round units. Of the 14,048 total housing units, approximately 66.2 percent are classified as multi-family units, 23.6 percent are classified as owner-occupied units, and 10.2 percent are vacant units. Over 90 percent of South Boston's housing was built before 1939. Much of the housing is in need of improvement. Currently, there is little demand for new housing due to its high cost. The 1980 median value of housing units in South Boston was $21,625. The housing unit values are dependent on location. The range of housing unit values for 1980 is approximately $12,500 to $34,500. The 1980 median monthly contract rent for units in multi-family buildings was approximately $125. 1980 monthly rental contracts ranged from $73 to $172 (U.S. Dept of Commerce 1980). The city demolishes approximately 15 buildings per year (Boston Redevelopment Authority 1979; Fay et al 1980). The housing stock ownership is fairly transient; based on a survey of South Boston residences, approximately 59 percent of all residents have lived in current dwelling units less than 5 years. Table 4.4-9 outlines length of residence in current dwelling units for South Boston in 1980.

The City of Boston has invested over $1,000,000 in the Housing Improvement Program (HIP) to assist South Boston homeowners in financing renovations to their homes (Boston Redevelopment Authority 1979). The HIP also provides rebates for the elderly and financial support for housing.

Five housing projects exist in South Boston. The Columbus Park area of South Boston contains the Mary Ellen McCormack Housing Project and The Old Colony Housing Project. Approximately 60 percent of the projects' residents are elderly (Boston Redevelopment Authority 1979). The Broadway or D Street Project is a state-owned, but City maintained, housing project which is located in the West Broadway area. The project includes the Condon Community School which provides indoor-outdoor recreational facilities to project residents. Due to fires, vandalism, and destruction to vacant units, the overall condition of the D Street project requires public funds for revitalization. The fourth housing project, the Peninsular Arms, is located on Sixth Street at L Street. This project provides 68 units of elderly housing. Finally, Foley Apartments is located on Eighth and H Streets.

4.4.7 References

Boston Redevelopment Authority. South Boston District Profile and Proposed 1979-1981 Neighborhood Improvement Program. 1979.

Boston Redevelopment Authority. Boston and Its Neighborhoods. May 1982. (1982a).

Boston Redevelopment Authority. Boston Employment Trends 1979-1980-1981. June 1982. (1982b).

Boston Traffic and Parking Department. Intersection Turning Movement Count, September 23, 1980. Prepared by Traffic Control Systems of Brighton, Massachusetts.

Fay, Spofford, and Thorndike, Inc, and Wallace, Floyd, Ellenzweig, Moore, Inc. Seaport Access System, South Boston - Preliminary Environmental Assessment. June 1980.

Heavne, Thomas. City of Boston Tax Assessor's Office and Baraniak, K. Stone & Webster Engineering Corporation. Personal Communication, November 23, 1982. 1982.

J.M. Cortell and Associates. Seaport Development, Boston Marine Industrial Park: Final Environmental Impact Report. 1980.

U.S. Department of Commerce, Bureau of the Census. Massachusetts General Population Characteristics. Tables P-1 and H-1. 1980.

Vanasse & Hangen Associates, Inc. Draft Environmental Impact Report: Building 114 Renovation, Boston Army Base; Boston MA. EOEA No. 4427. December 1982.

TABLE 4.4-1

EXISTING LEVELS OF SERVICE FOR SELECTED INTERSECTIONS IN SOUTH BOSTON

Intersection	Level of Service		
	1979 pm peak (1)	1981 am peak (2)	1981 pm peak (2)
Northern Avenue and B Street	A		
Northern Avenue and Atlantic Avenue		A	D
Congress Street and Atlantic Avenue		C	D
Summer Street and Atlantic Avenue		E	C
Summer Street and Viaduct Street		A	B
Summer Street and D Street	D		
Summer Street and Harbor		A	A
Broadway and A Street	A	C	B
East First Street and Summer/L Streets	A		
West First Street and D Street	A		
West Second Street and A Street	A		
Broadway and Dorchester Street	D		
Broadway and Frontage		C	D
Dorchester and West Fourth Street	A or B		
Dorchester and A Street/ West Fifth Street		A	A
Andrew Square	F		

TABLE 4.4-1 (Cont)

NOTES:

Highway Capacity Manual, 1965 Highway Research Board Designation.

Levels of Service:

A - No restrictions on operating speed, free-flow

B - Some traffic restrictions on operating speed, stable flow

C - Volume traffic restrictions on operating speed and maneuverability, stable flow

D - Traffic congestion restrictions, unstable flow

E - Traffic volume at or near capacity, unstable flow, stoppages

F - Traffic volumes above capacity, downstream restrictions, forced flow

SOURCES:

1. Fay, Spofford, & Thorndike, Inc 1980

2. Vanasse & Hangen Associates, Inc 1982

TABLE 4.4-2

TRAFFIC MOVEMENT SUMMARY AT INTERSECTION OF EAST FIRST AND SUMMER STREETS

	East First Street - Eastbound			East First Street - Westbound			Summer Street - Northbound			Summer Street - Southbound			
Time	Left	Straight	Right	Left	Straight	Right	Left	Straight	Right	Left	Straight	Right	Total
7:00-7:30	15	17	3	1	28	49	8	338	5	36	36	10	546
7:30-8:00	7	42	4	2	24	89	13	484	6	49	88	15	823
8:00-8:30	9	39	4	5	24	78	10	449	6	33	86	5	748
8:30-9:00	7	21	4	2	42	56	14	325	2	37	71	15	596
9:00-9:30	11	33	9	3	31	39	9	208	9	32	84	8	476
9:30-10:00	7	36	9	2	39	31	14	103	9	27	78	8	363
10:00-10:30	15	41	14	2	51	34	9	130	2	28	98	15	439
10:30-11:00	9	35	7	4	33	19	7	101	5	16	99	12	347
11:00-11:30	14	36	20	11	32	24	15	98	12	30	110	17	419
11:30-12:00	16	38	12	8	43	31	11	105	9	52	155	16	496
12:00-12:30	17	44	12	7	34	60	13	108	3	45	161	21	525
12:30-1:00	14	58	8	6	41	68	16	123	16	59	122	13	544
1:00-1:30	13	41	7	9	44	57	13	128	12	57	127	14	522
1:30-2:00	12	42	7	5	44	53	12	94	14	50	102	15	450
2:00-2:30	17	45	10	3	42	50	12	93	14	54	108	16	464
2:30-3:00	18	38	12	7	46	57	9	142	6	39	187	15	576
3:00-3:30	16	28	15	8	37	66	13	117	4	34	287	24	649
3:30-4:00	13	43	13	6	42	61	9	146	2	54	386	32	807
4:00-4:30	16	39	16	5	38	81	8	169	6	44	357	17	796
4:30-5:00	9	25	12	5	37	50	2	129	6	78	422	26	801

TABLE 4.4-2 (Cont)

Time	East First Street - Eastbound Left	East First Street - Eastbound Straight	East First Street - Eastbound Right	East First Street - Westbound Left	East First Street - Westbound Straight	East First Street - Westbound Right	Summer Street - Northbound Left	Summer Street - Northbound Straight	Summer Street - Northbound Right	Summer Street - Southbound Left	Summer Street - Southbound Straight	Summer Street - Southbound Right	Total
5:00-5:30	7	26	14	7	26	33	7	125	8	69	373	29	724
5:30-6:00	5	13	9	3	18	35	7	98	4	31	232	6	461
Total	267	780	221	111	796	1121	231	3813	160	954	3769	349	
Grand Total		1268			2028			4204			5072		12,572

SOURCE:

Boston Traffic and Parking Department. Intersection Turning Movement Count, September 23, 1980. Prepared by Traffic Control Systems of Brighton, Massachusetts.

TABLE 4.4-3

AVERAGE WEEKDAY TRUCK TRIPS BY ENTRY/EXIT POINT - 1976

Entry/Exit Point:

	1 Northern Ave	2 Congress St	3 Summer St	4 Broadway	5 West Fourth St	6 South-ampton St	7 Boston St	8 Dor-chester Ave	9 Columbus Rd	10 Day Blvd	Percent of Total	Total Trips
Origin or (% by zone) Destination												
Zone A - North of First Street and West of Fort Point Channel	98	94	92	66	62	58	47	60	50	-	76	7083
Zone B - West of Old Colony Road and South of Broadway	1	4	3	25	27	32	28	26	26	-	16	1531
Zone C - South of First Street and East of Old Colony Road	1	2	5	9	11	10	25	14	24	-	8	750
Total Number of Truck Trips	1201	1220	1751	2007	850	1202	319	486	328	No Trucks Allowed	100	9364

SOURCE:

Boston Traffic and Parking Department 1980.

TABLE 4.4-4

PERCENT DISTRIBUTION OF EMPLOYMENT BY INDUSTRY, SOUTH BOSTON AND BOSTON, 1980-1981

	Industry	South Boston Percent Distribution of Labor Force 1980	Boston Percent Distribution of Labor Force 1980	Boston Percent Distribution of Labor Force 1981
Primary:	Agriculture and Mining	0	0(1)	0(1)
	Construction	3	2	2
Secondary:	Manufacturing	18	10	9
	Trade: Wholesale	1	5	5
	Retail	11	11	11
Tertiary:	Transportation, Communication, Public Utilities	9	7	7
	Finance, Insurance, Real Estate	5	12	12
	Services	20	33	34
Other:	Government	29	18	18
	Proprietors and Others	4	2	2
	Total	100	100	100

NOTE:

1. Less than 0.5%.

SOURCES:

Boston Redevelopment Authority. Boston and Its Neighborhoods. May 1982.

Boston Redevelopment Authority. Boston Employment Trends 1979-1980-1981. June 1982.

TABLE 4.4-5

LOCATION OF PLACE OF WORK FOR SOUTH BOSTON'S EMPLOYED WORK FORCE, 1980

Location	Percent of Total South Boston Employment
Within South Boston Neighborhood	25
Downtown Boston	19
Elsewhere in Boston	46
Boston Metropolitan Area	10
Outside Boston Metropolitan Area	0
Total	100

SOURCE:

Boston Redevelopment Authority. Boston and Its Neighborhoods. May 1982

TABLE 4.4-6

PERCENT DISTRIBUTION OF OCCUPATIONS OF SOUTH BOSTON'S EMPLOYED WORKERS, 1970 AND 1980

Occupation	Percent of Total Employed Labor Force, 1970	Percent of Total Employed Labor Force, 1980	Percent Change 1970-1980
Professional, Managerial, Technical (1)	13	9	-4
Sales Workers	4	1	-3
Clerical	30	28	-2
Craftsmen	12	18	+6
Operatives	17	9	-8
Laborers	6	6	-
Service Workers, including Private Households	18	29	+11

NOTE:

1. Category includes farmers.

SOURCES:

U.S. Department of Commerce, Bureau of the Census. Massachusetts General Population Characteristics. Tables P-1 and H-1. 1980.

Boston Redevelopment Authority. Boston and Its Neighborhoods. May 1982.

TABLE 4.4-7

PERCENT DISTRIBUTION OF SOUTH BOSTON'S POPULATION BY LARGEST SOURCE OF INCOME, 1979

Income Source	Percent of South Boston's Population
Wages and Salaries	61
Rents from Properties	0
Social Security	17
Unemployment, SSI, AFDC, Welfare	13
Veterans Benefits	6
Pension Annuity	3
Total	100

SOURCE:

Boston Redevelopment Authority. Boston and Its Neighborhoods. May 1982.

TABLE 4.4-8

PERCENT DISTRIBUTION OF SOUTH BOSTON'S POPULATION BY INCOME LEVEL, 1979

Annual Income ($1000)	Percent of Individuals[1]	Percent of Families
Less than $3	4	0
$3-7	44	34
$7-10	15	20
$10-15	14	20
$15-20	4	5
$20-25	8	7
$25-30	7	10
$30-40	0	0
$40-50	1	2
Greater than $50	1	2
Median income	$7300	$9450

SOURCE:

Boston Redevelopment Authority. Boston and Its Neighborhoods. May 1982.

NOTE:

1. Does not add to 100 percent due to rounding.

TABLE 4.4-9

LENGTH OF RESIDENCE IN CURRENT DWELLING UNIT, 1980

Years	Percent of South Boston
Less than 1	17
1	10
2	6
3-5	26
6-9	12
10-14	6
15-19	5
20-29	6
30 and over	12
Total	100

SOURCE:

Boston Redevelopment Authority. Boston and Its Neighborhoods. May 1982.

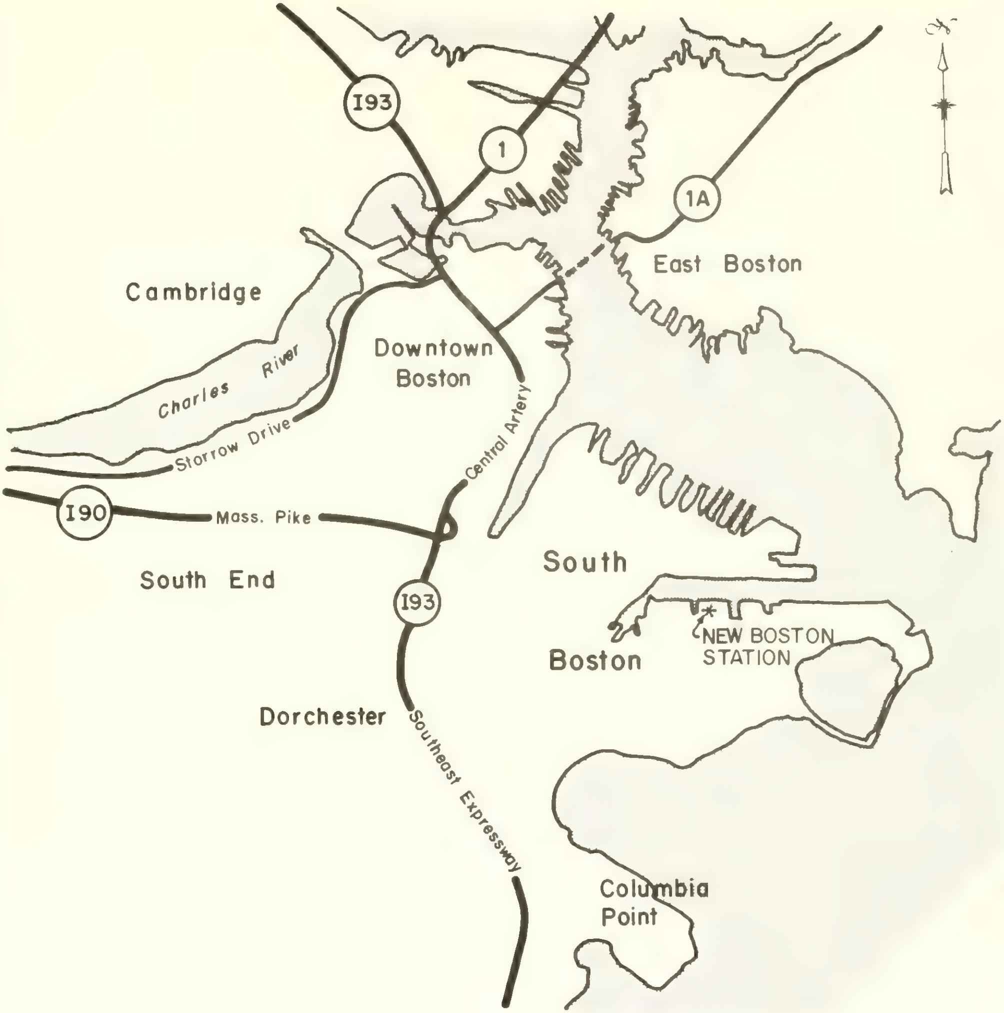


FIGURE 4.4-1
THE REGIONAL ROAD NETWORK
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

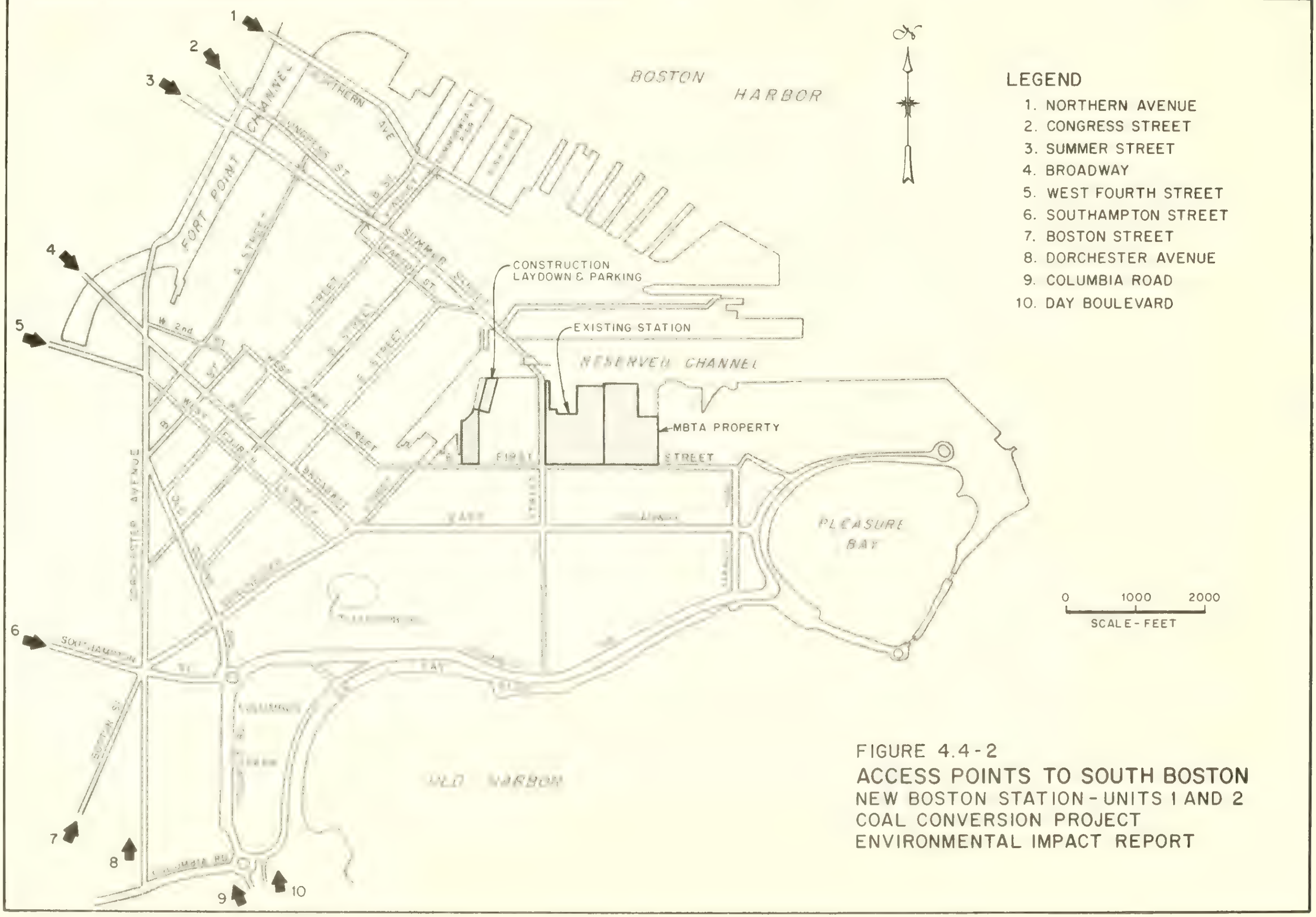
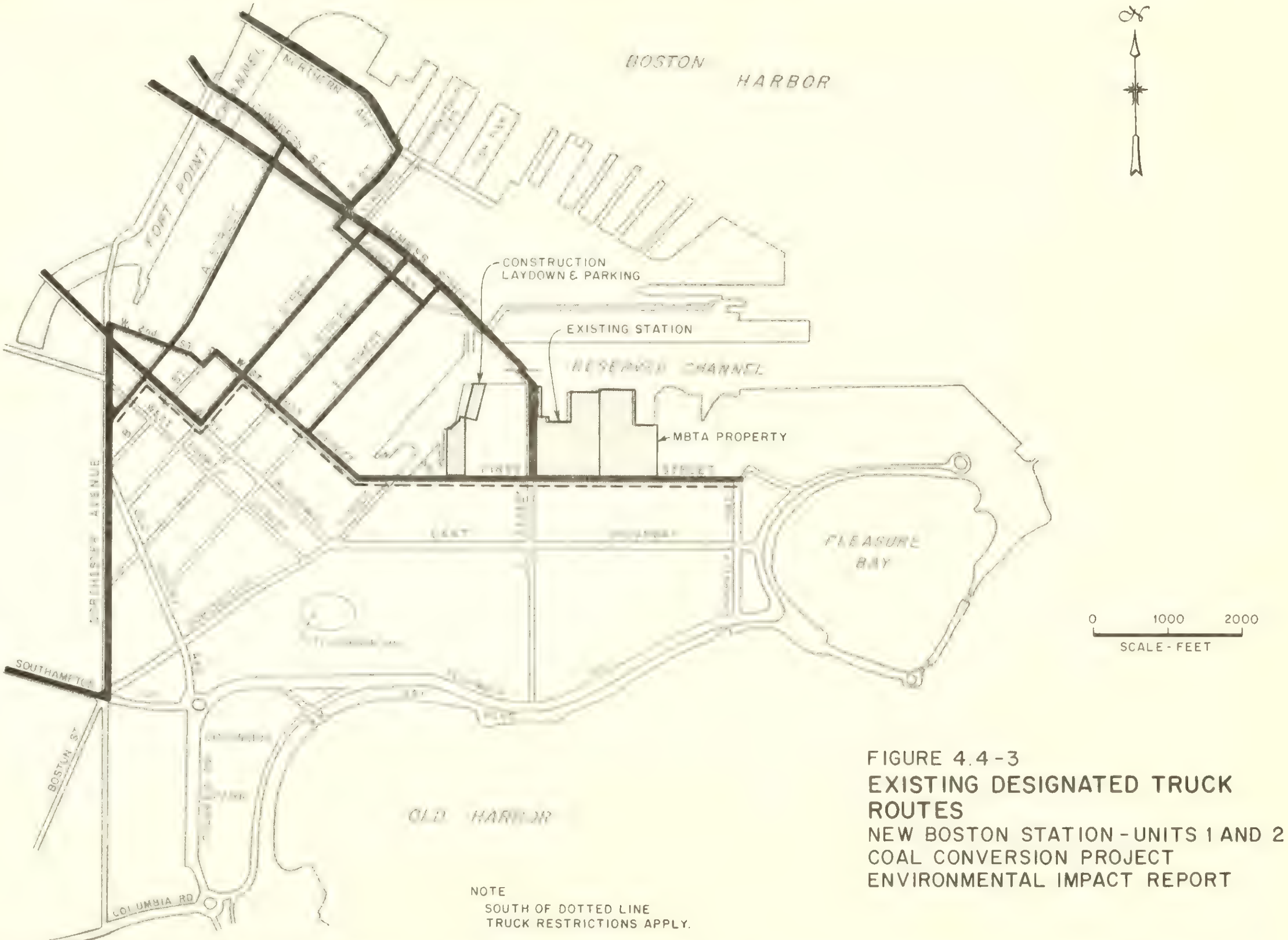


FIGURE 4.4-2

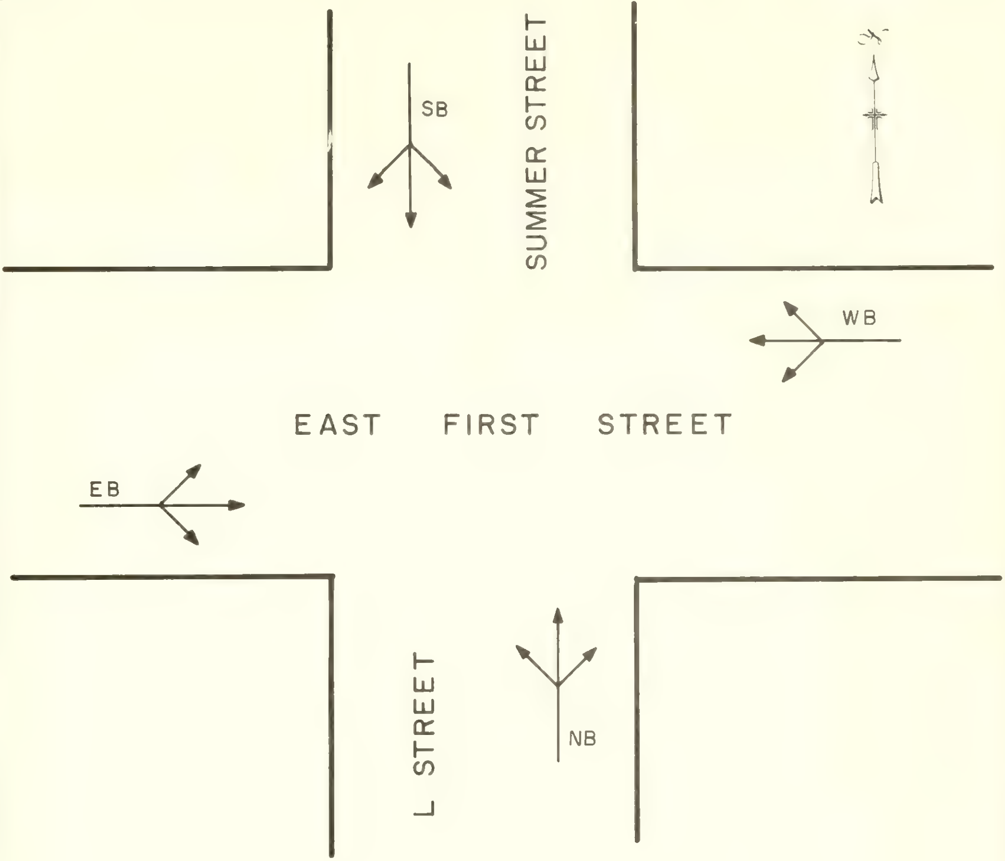
ACCESS POINTS TO SOUTH BOSTON

NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTE
SOUTH OF DOTTED LINE
TRUCK RESTRICTIONS APPLY.

FIGURE 4.4-3
EXISTING DESIGNATED TRUCK ROUTES
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



STREET		ENTERING VOLUME	FLOW PERCENT
EAST FIRST STREET	EB	1268	10.1
EAST FIRST STREET	WB	2028	16.1
L STREET	NB	4204	33.4
SUMMER STREET	SB	5072	40.4
TOTAL		12,572	100 %

FIGURE 4.4-4
TRAFFIC DEMAND VOLUME
SEPTEMBER 23, 1980
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

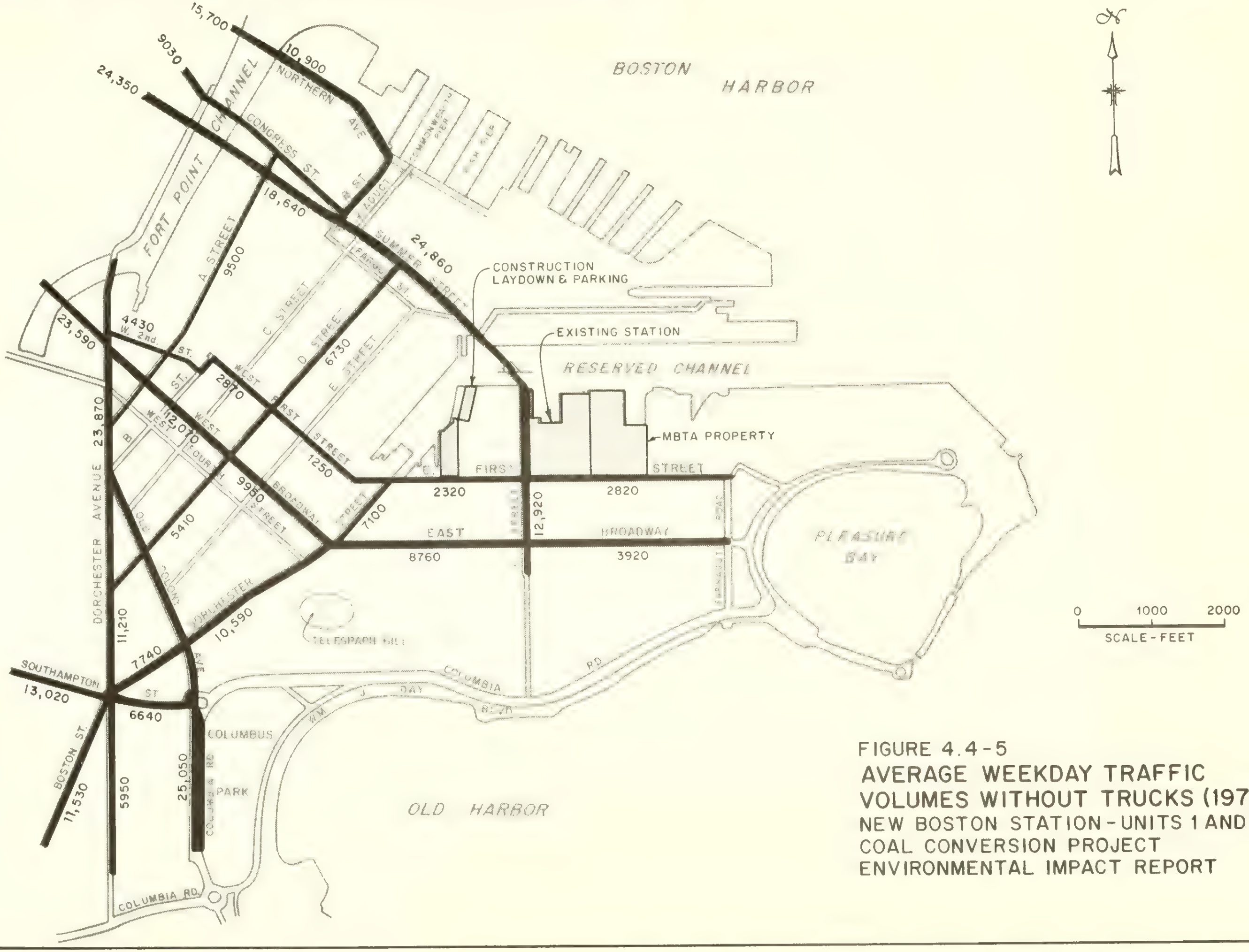


FIGURE 4.4-5
AVERAGE WEEKDAY TRAFFIC VOLUMES WITHOUT TRUCKS (1979)
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

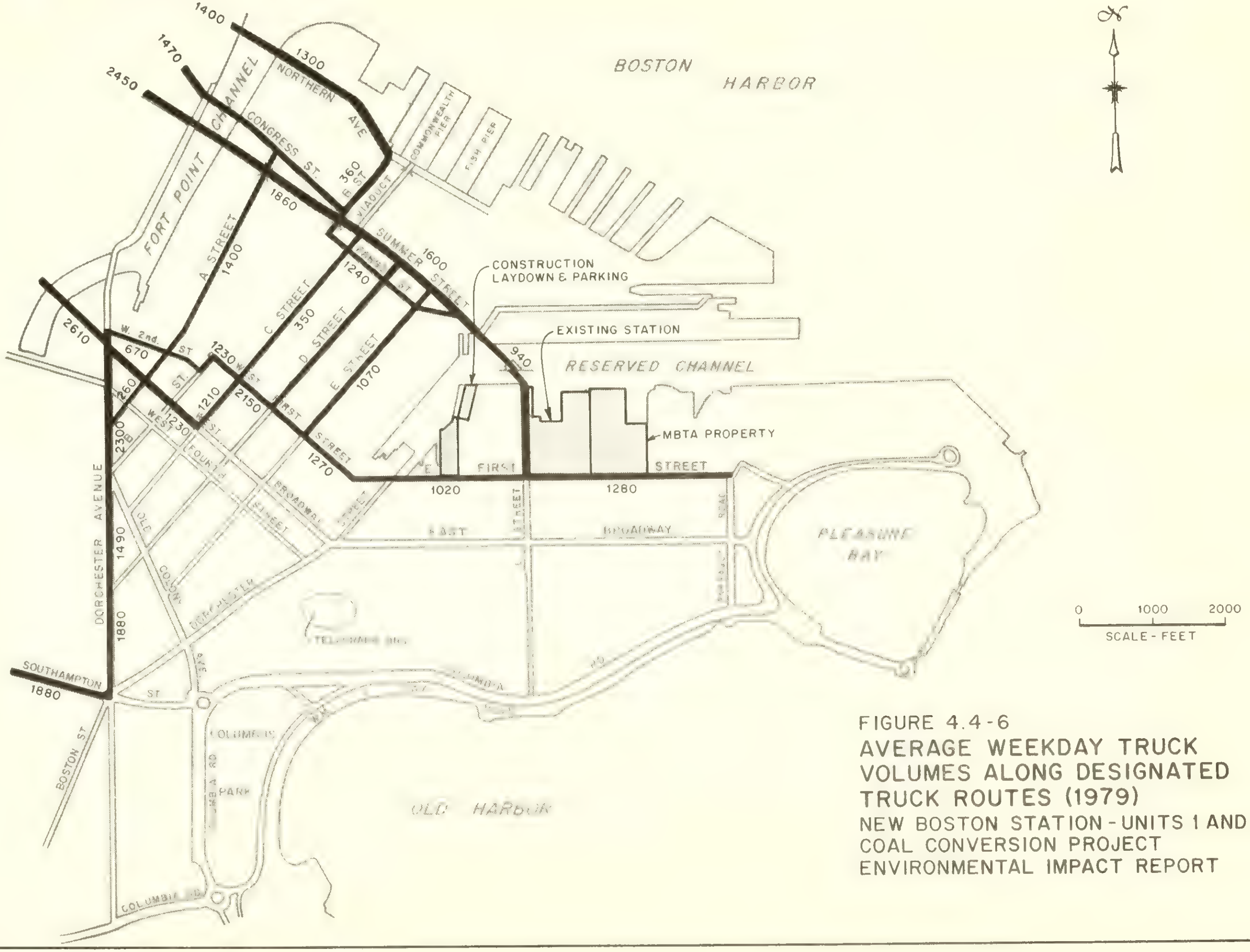


FIGURE 4.4-6
AVERAGE WEEKDAY TRUCK VOLUMES ALONG DESIGNATED TRUCK ROUTES (1979)
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

4.5 FEATURES OF HISTORICAL AND ARCHAEOLOGICAL INTEREST

4.5.1 Description

The Massachusetts Historical Commission has reported that there are no known historic or archaeological properties within the New Boston site area (see Appendix B). The area of South Boston is predominantly filled land (filled since the mid-1830s). No recorded archaeological properties have been identified in the area. In addition, the majority of land at New Boston Station has already been disturbed. It is unlikely that any resources of archaeological significance exist onsite.

Three National Register Historic Places exist in South Boston: Dorchester Heights National Historic Site, Fort Independence at Castle Island, and South Station Headhouse (U.S. Department of Interior 1982). One Boston historical landmark designated by the Boston Landmark Commission exists in South Boston. The Harrison Loring House, located on East Broadway, was designated a historic landmark in 1981. (City of Boston, 1982)

4.5.2 References

City of Boston, Environment Department, Boston Landmarks Commission. Status of Petitions for Designation. November 1982.

U.S. Department of the Interior, Washington, D.C. Heritage Conservation and Recreation Service, National Register of Historic Places. September 16, 1982.

4.6 SCENIC AND CULTURAL QUALITY OF THE AREA

A scenic survey of the area surrounding New Boston Station indicates that the visual perspectives of the station with the largest impact occur from properties adjacent to the station, from high points in South Boston, and from points along the South Boston shoreline. The viewshed including New Boston Station is characterized by industrial uses along the Reserved Channel. The land uses of these areas, as discussed in Section 4.2.2, are primarily residential, industrial, and recreational. The properties in South Boston that abut the station are industrial and residential. The area north of the Reserved Channel is primarily industrial.

The existing stacks and plumes are the predominant features visible from points west of the plant along Dorchester Avenue and from Andrew Square. Trees, homes, and the general topography of the land serve to screen or block these features from view from many perspectives. Visual contact from the north beyond Northern Avenue and from the south beyond Columbus Park is minimal. A more detailed visual assessment of New Boston Station is provided in Section 7.6.

The Children's Museum, located on Museum Wharf near Fort Point Channel; the Boston Tea Party Ship and Museum, located along the Congress Street Bridge; and the South Boston Vietnam War Memorial, located at Independence Square are cultural resources of South Boston.

4.7 DESCRIPTION OF EXISTING FACILITY

A description of the site property is included in Section 4.1. This discussion describes those structures and systems which comprise the existing New Boston Station.

4.7.1 Site Layout

New Boston Station Units 1 and 2 are oil-fired, with a nominal net capacity of 350 MW and a maximum net capacity of 380 MW each. The site has been used for coal- and oil-fired power production since the turn of the century, and the existing New Boston Station units commenced operation in 1965 and 1967. Coal was last burned at L Street Station in July 1967.

The site also contains the retired oil-fired L Street Station Units 74, 75, and 76, which were installed in 1939-1942 and deactivated in 1981, and the 7 and 8 side boilers installed in 1920-1930 and retired in 1965 and 1971, respectively. L Street equipment is occasionally used to transfer steam between New Boston Station and Kneeland Street Station. Two package boilers are being installed in the L Street Station to be used for plant startup and heating steam for New Boston Station Units 1 and 2.

Plot plans showing the existing New Boston Station site, the adjacent Massachusetts Bay Transportation Authority (MBTA) site, and the K Street properties are presented in Figures 4.7-1, 4.7-2, and 4.7-3, respectively. Photographs of the existing station are presented in Section 7.6.

4.7.2 Fuel Supply System

New Boston Station Units 1 and 2 are currently fired with No. 6 residual fuel oil having a 1.0 percent sulfur content. Fuel is purchased from Texaco and is delivered by ocean-going tanker to the Texaco terminal in South Boston. Boston Edison Company (BECO) does not currently own a tanker dock at New Boston Station, although a small barge facility is available for emergency use.

Each month BECO supplies Texaco with a 3-month forecast of New Boston Station fuel oil needs. BECO also specifies for each of the 3 months the expected contractual residual fuel oil supply from Texaco. Based on this information, Texaco schedules the necessary tanker deliveries to supply New Boston Station requirements and arranges unloading and storage of oil for the station. Units 1 and 2 receive oil from the Texaco oil tank farm via an underground pipeline and store it in two day tanks, each with a capacity of 15,000 barrels. Fuel is pumped from these tanks to the boilers. A third oil tank on BECO property with a capacity of 130,000 barrels is used to store an emergency supply of 0.5 percent sulfur oil. This oil is held onsite for use in

New Boston boilers in case of an environmental temperature inversion declared by the Department of Environmental Quality Engineering (DEQE).

BECO has an agreement with Texaco whereby all oil not purchased directly from Texaco can be delivered and/or stored utilizing the same facilities.

4.7.3 Power Generation System

New Boston Station is comprised of two units. Unit 1 is a Babcock & Wilcox universal-pressure type steam generator which supplies steam to a Westinghouse 380,000 kW nameplate, reheat condensing, cross-compound, double-flow steam turbine generator. Unit 2 has the same type of steam generating equipment as Unit 1, but it supplies steam to a General Electric 380,000 kW nameplate, reheat condensing, tandem-compound, four-flow steam turbine generator.

Each steam generating unit has a maximum continuous capability to generate 2,640,000 lb/hr of steam at 2530 psi gage, 1000°F at the superheater outlet, and to reheat 2,330,000 lb/hr of steam from 660°F, 610 psi gage, to 1000°F when supplied with feedwater at 498°F.

Each steam generator is equipped with 24 circular mechanically atomizing fuel oil burners, arranged on three levels along the front (south) and rear (north) walls of the furnace.

Both steam generators were originally designed to accommodate future burning of pulverized coal. Space was allocated for all necessary pulverized coal-firing equipment, however, the equipment was not installed.

General station operation procedures are discussed in Section 4.7.7.4.

4.7.4 Cooling Water Systems

Each unit of New Boston Station is provided with a circulating water system and a cooling water system. The circulating water system provides once-through cooling water for the main steam condenser and the cooling water system heat exchangers. Two vertical circulating water pumps, per unit, take suction from a divided screenwell located in the west side of the New Boston Station inlet of the Reserved Channel. The return water is directed to the east side of the New Boston Station inlet, separated from the intake screenwells by a thermal barrier. Each screenwell is equipped with traveling water screens. These screens are periodically washed using screen wash pumps which are supplied with water from their respective circulating water systems.

Sodium hypochlorite is periodically injected into the circulating water system to control marine growth in the condenser and circulating water system. The chlorine dosage is limited to ensure compliance with the National Pollutant Discharge Elimination System (NPDES) limitation of less than 0.1 ppm total residual chlorine at any time. The circulating water system and condenser are designed to permit reverse two-pass operations for additional control of marine growth and deicing of the screenwell.

The cooling water system is a closed loop cooling system filled with deaerated condensate which transfers heat to the circulating water system via the cooling water system heat exchangers. The cooling water system cools numerous pieces of equipment including turbine oil coolers, generator seal oil and hydrogen coolers, service and instrument air compressors, air preheater oil coolers, fluid drive oil coolers, deaerator pumps, auxiliary boiler feed pump, forced-draft fans, gas recirculation fans, and burner oil pumps.

The station also contains a separate cooling water system for the electrical frequency changer which is required to produce the frequency currently used by the MBTA. This system is supplied with cooling water from the Reserved Channel and discharges via a separate discharge point to the Reserved Channel.

NPDES permit limitations for these discharges from the existing station are presented in Section 3.1.

4.7.5 Pollution Control Equipment

Pollution control at the existing station is effected primarily by the wastewater treatment equipment and the use of low sulfur fuel oil (1 percent sulfur). Discussions of current air emissions from the station are included in Sections 5.3.1.2, 5.3.2.2, and 7.1.2.1.

The wastewater treatment system was modified in 1979 to ensure compliance with best available technology (BAT) effluent limitations. Effluent limitations imposed by the current NPDES permit are presented in Section 3.1.

Wastewater treatment is accomplished by a new state-of-the-art system designed to effectively treat all station liquid wastes, and consists of the following subsystems as presented on the flow diagram shown in Figure 4.7-4:

1. Waste neutralization tank for the co-neutralization of anion/cation demineralizer regeneration wastes.

2. Treatment basins for equalization of waste flow and waste quality, and for surge storage.

3. Lime and caustic feed system to raise the pH in the aerator/mixer well to promote flocculation and improved removal efficiencies.

4. Clarifier/thickener to promote coagulation and settling of influent wastewater at a design rate of 600 gpm and thickening of lime or caustic generated sludge.

5. Polishing pond to provide up to 40 hours of additional retention time at the design flow rate of 600 gpm, thereby ensuring compliance with effluent limitations.

6. Final pH adjustment chamber to reduce the pH of the polishing pond effluent to within the NPDES limits of between 6.5 and 8.5.

7. A final monitoring/recording chamber for continual monitoring of effluent pH and flow.

8. Sludge dewatering equipment utilizing one rotary drum vacuum filter to dewater sludges generated in the clarifier/thickener.

4.7.6 Station Wastes and Their Disposal

Existing station waste streams consist of station process and cooling waters subject to an NPDES permit, plant sanitary wastewaters, and solid wastes in the form of wastewater treatment sludges, bottom ash, and general refuse. Process station wastewaters are treated prior to discharge to the Reserved Channel. The station has been granted interim status as a permitted hazardous waste treatment facility under federal (40CFR122) and state (310CMR30) regulations, due to the corrosive characteristic of certain raw station wastewaters. The existing wastewater treatment system for the station process wastewaters is discussed in Section 4.7.5. Effluent limitations imposed by the NPDES permit and existing discharge charactistics are presented in Section 3.1. Cooling water and treated station process wastewaters are discharged to the Reserved Channel. All plant sanitary wastewater (approximately, 6250 gpd) enters the Boston Water and Sewer Commissions' sewage collection system.

Waste oil is recovered in the existing wastewater treatment system. Recovered waste oils are disposed offsite by a contracted disposal firm, in accordance with applicable DEQE waste oil regulations (310CMR30).

Solid wastes generated at New Boston Station consist of wastewater treatment sludge, bottom ash, and general refuse. All station solid wastes are hauled to an appropriately licensed landfill for disposal by a contracted, appropriately licensed disposal firm. The estimated quantities of solid wastes generated during 1982 are as follows:

General refuse - 750 cu yd
Bottom ash - 200 cu yd
Wastewater treatment sludge - 1000 cu yd

4.7.7 Station Operation

4.7.7.1 Boston Edison Company Service Area

The BECO service area includes primary power and distribution service to 46 cities and towns, and bulk service to seven cities and towns operating separate local municipal power distribution companies.

The BECO service area is shown in Figure 4.7-5.

4.7.7.2 Power Dispatch

BECO owns and operates seven major and ten minor generating units. The seven major generating units include four units at Mystic Station with a total nominal capacity of 984 MW (maximum capacity of 1011 MW), two units at New Boston Station with a total nominal capacity of 700 MW (maximum capacity of 760 MW), and one unit at Pilgrim Station with a nominal capacity of 670 MW. All of the units except Pilgrim No. 1 are oil-fired units. Historically these seven units have provided over 85 percent of BECO's generation requirements and have comprised nearly 90 percent of BECO's total fuel cost. The ten minor generating units are all combustion turbines used for peak load operation and cold start backup. These combustion turbines historically have comprised less than 1 percent of both BECO's total generation requirements and total fuel cost.

As a member of New England Power Pool (NEPOOL), all of BECO's generating units and major transmission facilities are dispatched by New England Power Exchange (NEPEX), the central dispatch operation center for NEPOOL. Central dispatching through NEPEX provides BECO customers (and those of other NEPOOL member companies) two principal benefits: increased system reliability and lower costs.

Through participation in NEPEX, reliability is enhanced in three ways. First, NEPEX dispatches, in economic order, individual units regardless of owner in order to provide adequate operating reserves throughout the region at all times. Second, maintenance is scheduled on a pool-wide basis to ensure adequate operating reserves at all times. Third, contingency and emergency procedures are designed and implemented on a pool-wide basis to mitigate the effects of abnormal events on reliability. Without the power pool, BECO would have to provide greater reserve capacity to ensure the same level of system reliability.

Participation in NEPEX provides BECO customers with lower costs in two ways: first, through a reduction in reserve capacity requirements, and second, through economic dispatching. Reductions in reserve capacity requirements are achieved through the sharing of reserve capacity on a pool-wide basis. Through capacity sharing, BECO and other pool participants are able to take advantage of the economies of scale associated with building and operating large generating stations without a resultant loss in reliability.

Costs are also reduced through economic dispatching. BECO and other pool participants commit their generation to the NEPEX dispatch. NEPEX then dispatches all units as though they were part of one system. Economic dispatching is accomplished through the use of computer programs which make incremental cost decisions for each generating unit as load demand varies. In this way, electric power is generated by the units with the lowest, short-run marginal cost, regardless of owner.

In order to meet the minute-by-minute demands of the systems, both New Boston units are dispatched through communications links with the NEPOOL dispatch center. This is accomplished in a different manner for each unit. Dispatch of Unit 1 is via direct telephone communication with NEPEX to manually increase or decrease unit generation output. Dispatch of Unit 2 is via a telemetered signal from NEPEX, which automatically increases or decreases unit generation output.

4.7.7.3 Mode of Station Operation

Under normal NEPOOL system conditions, New Boston Station Units 1 and 2 are at full load from about 9 am to 9 pm, and are cycled to some reduced load during the remaining hours. Annual average capacity factors are generally in the range of 68 to 72 percent of maximum capacity. Should operation problems develop in either unit, the affected unit can be maintained in a steady-load condition until the problem is remedied or operating personnel can request a scheduled outage to correct the problem.

Maintenance and inspection of these units is performed annually through scheduling with NEPEX. Maintenance inspections generally vary between 2 and 12 weeks in duration. The units are also scheduled out-of-service an average of 2 to 3 times per year for shorter durations (3 to 4 days) for boiler cleaning, condenser cleaning, and minor maintenance.

4.7.7.4 General Operating Procedures

Specific routine operating procedures are followed in the day-to-day operation of New Boston Station Units 1 and 2 in order to maintain generating plant personnel safety, equipment reliability and efficiency, and to achieve compliance with regulatory (EPA, DPU, etc) requirements while generating electricity. Examples of these procedures are as follows:

- Safety - Plant personnel are trained to perform their work in accordance with the Boston Edison Safety Procedures. These procedures include safely isolating generating plant equipment undergoing maintenance or repair and maintaining a safe working environment by keeping all locations of the plant free of wet or oily floors and free of debris.

- Reliability/Efficiency - Reliability and efficiency are maintained through a program of surveillance and maintenance of plant equipment. Various disciplines within the operation and maintenance groups follow preventive maintenance schedules established for servicing the various equipment. Servicing requirements include instrument calibration, equipment lubrication, and adherance to equipment design pressure and temperature limitations.

- Regulatory Compliance - Sulfur emissions are controlled by limiting the sulfur content of the fuel used in accordance with state regulations. Particulate emissions and opacity limits are monitored for compliance and are controlled by combustion optimization, cleaning of fuel oil burners, and continual soot blowing of boiler tubes and air heaters. Fuel oil burners are cleaned and nozzle sizes measured by plant operating personnel on a four burner/unit/day schedule to achieve a weekly cycle of cleaning and inspecting all operating burners for each unit.

  Compliance with plant wastewater effluent limitations, set by the facility's NPDES permit, is achieved through the use of the wastewater treatment system. Monitoring of the station outfalls in accordance with the NPDES permit requirements ensures that discharges are within limits. Reliability and efficiency of the wastewater treatment system is maintained through a program of surveillance and maintenace of equipment and instrumentation.

  The plant is also in compliance with all federal and state hazardous waste regulations and has an interim status permit for the treatment of hazardous wastes under the Massachusetts Phase I Hazardous Waste Regulations. This permit is required for the treatment of corrosive wastes in the station's wastewater treatment system.

The transportation and disposal of solid wastes generated by the station is performed under strict compliance with applicable federal and state regulations. If the waste is classified hazardous, a manifest would accompany the waste as it is conveyed by licensed transporters to a licensed disposal facility. Special wastes, as defined by the state code, are conveyed to licensed landfills by contracted, licensed transporters.

BECO optimizes station operation through the use of a Heat Rate Improvement Program initiated in the late 1970s. A heat rate coordinator works with the technical personnel from the Test and Results Group on methods designed to identify heat rate related problems and ultimately improve heat rate and unit performance. The Test and Results Group has developed a comprehensive heat rate monitoring and data analysis program to analyze the various operating parameters and determine what effect each parameter has on a particular unit's heat rate. Results are utilized by station management to assist in optimizing each unit's performance. This analysis of operating data which ultimately leads to the optimization of unit performance is known as the Heat Rate Improvement Program. The program also provides for a continuous display of each unit's heat rate in the operating control rooms so that operators are constantly aware of a unit's heat rate, permitting prompt action and adjustments, as necessary.

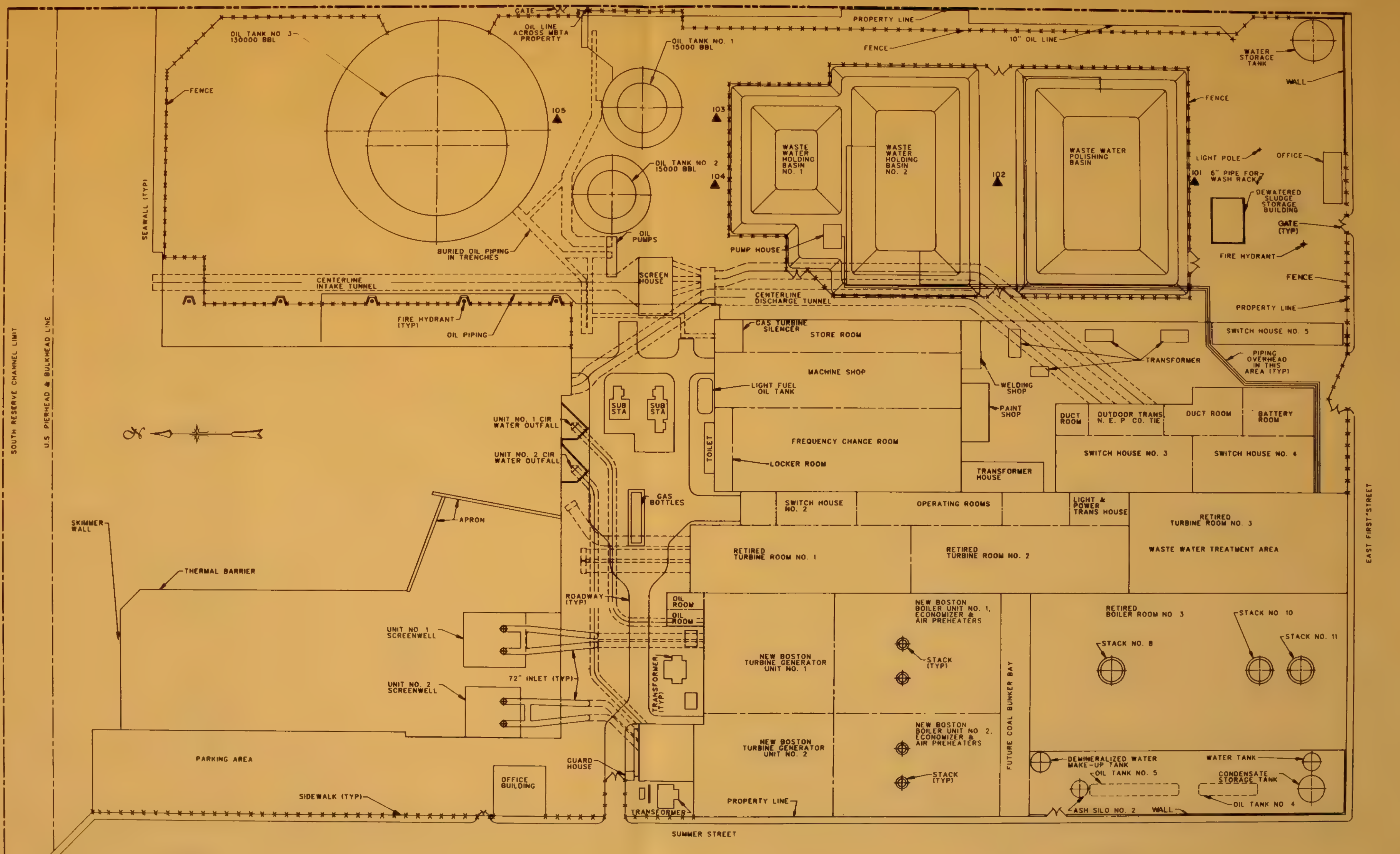


FIGURE 4.7-1

PLOT PLAN-EXISTING STATION

NEW BOSTON STATION-UNITS 1 AND 2

COAL CONVERSION PROJECT

ENVIRONMENTAL IMPACT REPORT

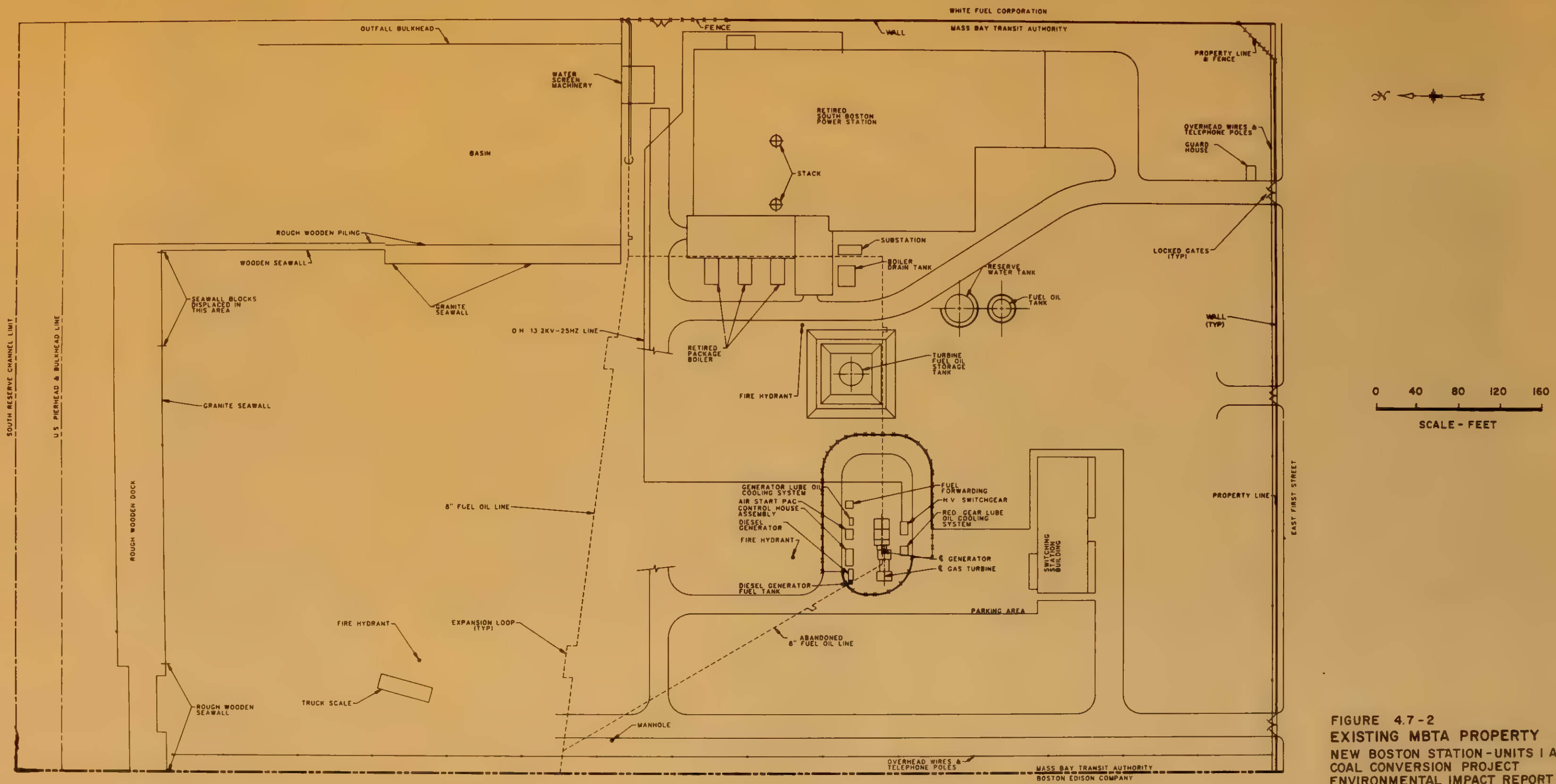


FIGURE 4.7-2
EXISTING MBTA PROPERTY
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

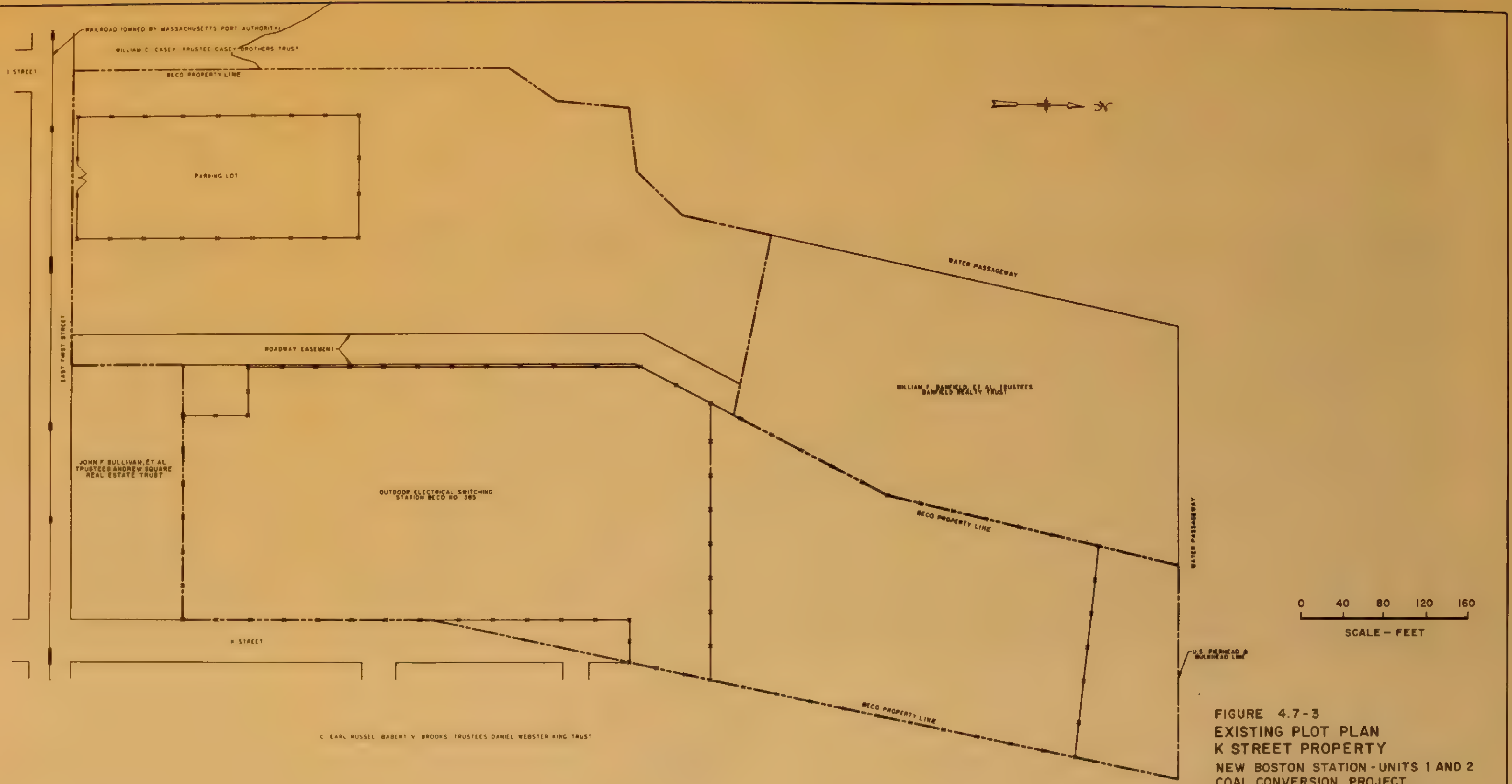


FIGURE 4.7-3
EXISTING PLOT PLAN
K STREET PROPERTY
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

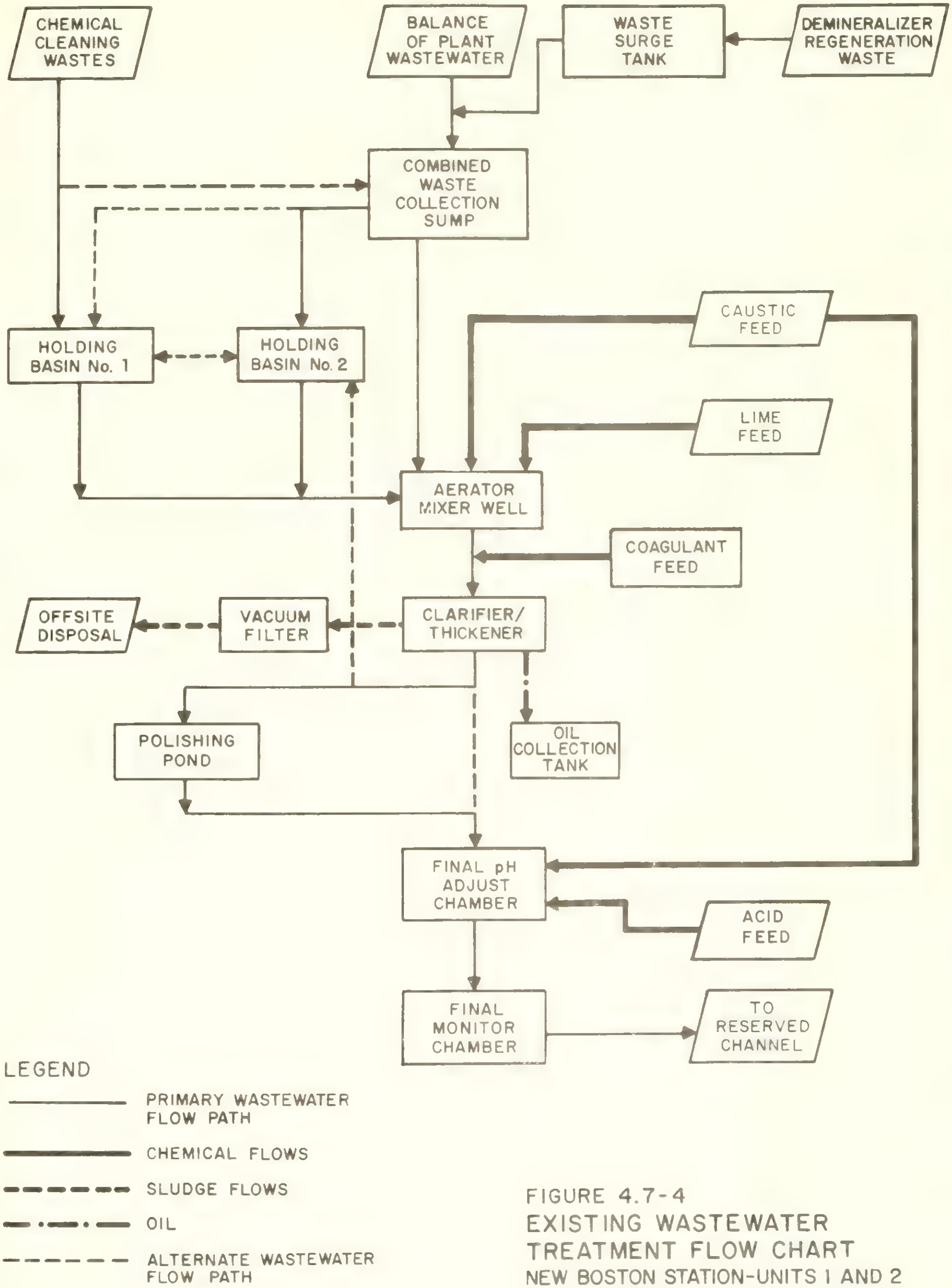
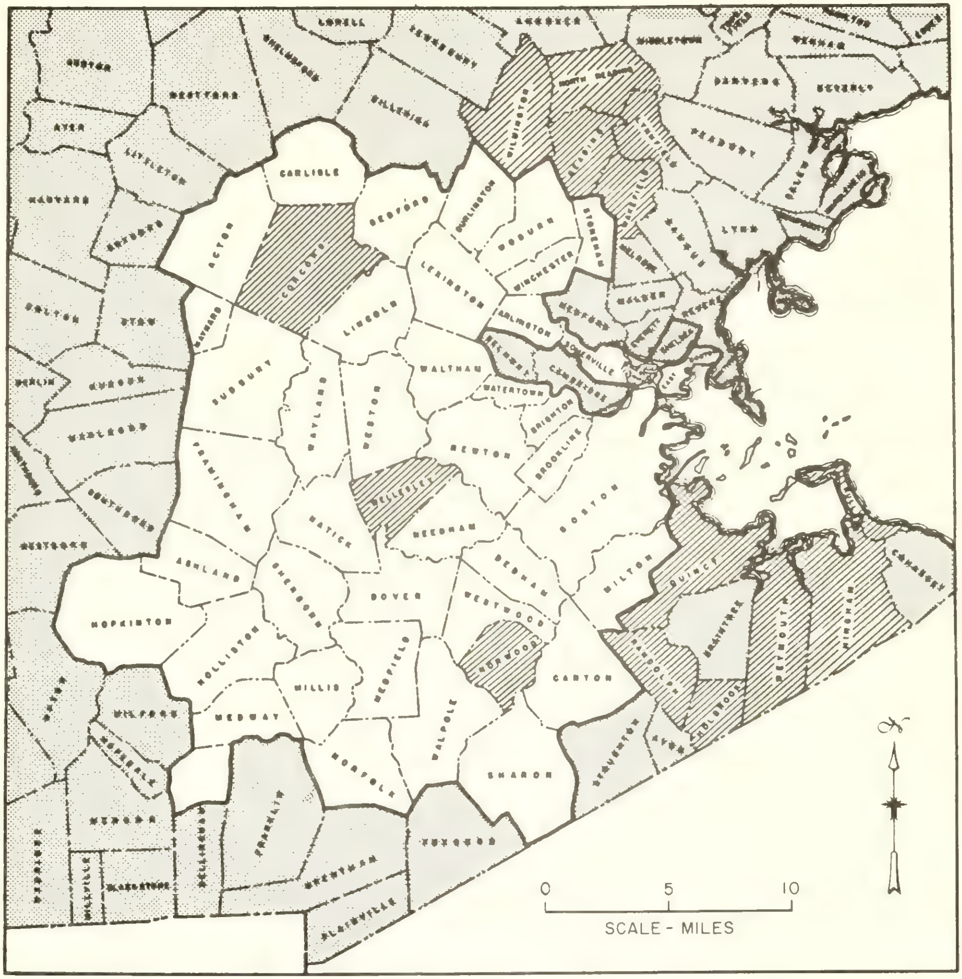


FIGURE 4.7-4

EXISTING WASTEWATER TREATMENT FLOW CHART

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



LEGEND

— TERRITORIES WITHIN SERVICE AREA

▒ TERRITORIES OUTSIDE SERVICE AREA

▨ AREA SERVED IN BULK

FIGURE 4.7-5
TERRITORY SERVED BY
BOSTON EDISON COMPANY
NEW BOSTON STATION-UNITS I AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

SECTION 5

DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1 CLIMATOLOGY

The climate of the New Boston Station area is best described with meteorological data collected at the National Weather Service Office at General Logan International Airport in Boston, Massachusetts. The airport is located approximately 1.9 miles northeast of the station.

The climate of the region is continental; however, the Atlantic Ocean has a significant moderating effect. Sea breezes occur on hot spring and summer afternoons displacing the warm, westerly current with a cool, moist east wind off the water. These breezes generally develop several hours after sunrise and persist for most of the afternoon. The region is situated near 42°N latitude, in the prevailing westerlies, and the weather undergoes alternating intrusions of tropical and polar air masses. In the early fall, hurricanes can bring destructive winds to the area. From late October to late April, major east coast storms bring significant rains and snows. During the warmer season of May through August, rainfall is mostly limited to showers and thunderstorms which accompany frontal passages. Thunderstorms occur on an average of 19 days during the year. On the average, precipitation occurs 1 out of 3 days throughout the year.

New England is affected by high- and low-pressure systems which originate from areas of North America which differ significantly in climate. The direction of air flow and duration of a particular air flow direction over New England depends on the track (relative to New England) and speed of these high- and low-pressure systems.

Two types of high-pressure systems or air masses frequently affect New England: polar continental and tropical maritime. The tracks of these two types of systems are shown in Figure 5.1-1. A polar continental high-pressure system originates in the polar region of the North American continent. This type of system affects New England during all seasons and usually brings dry, abnormally cold air with partly cloudy sky conditions. The tropical maritime high-pressure system originates from the tropical region of the Atlantic Ocean and usually imports abnormally warm, very moist air to New England.

Low-pressure systems which affect New England generally move from the west or the south as shown in Figure 5.1-2. Winter low-pressure systems are larger and more intense than summer systems and tend to track up the Atlantic seaboard. Flows off the ocean, affecting all of New England for extended periods of time, are usually the result of the counterclockwise flow around a low-pressure system passing to the east of New England. Low-pressure systems that originate in the center of the United States are usually drier and less intense than the coastal low-pressure systems.

The path or trajectory of a parcel of air originating from Boston is defined by the size, shape, track, and speed of a high- or low-pressure system influencing the New England area. In addition, the vertical motion of the atmosphere over New England is an important factor in a parcel trajectory. The track of a system becomes more significant in defining the parcel trajectory as the travel speed of the system increases. If a high- or low-pressure system is stationary near New England, the parcel path is basically defined by the clockwise or counterclockwise circulation of the system, respectively. Parcel trajectories can also be influenced by localized, diurnal flow reversals characteristic of the sea breeze.

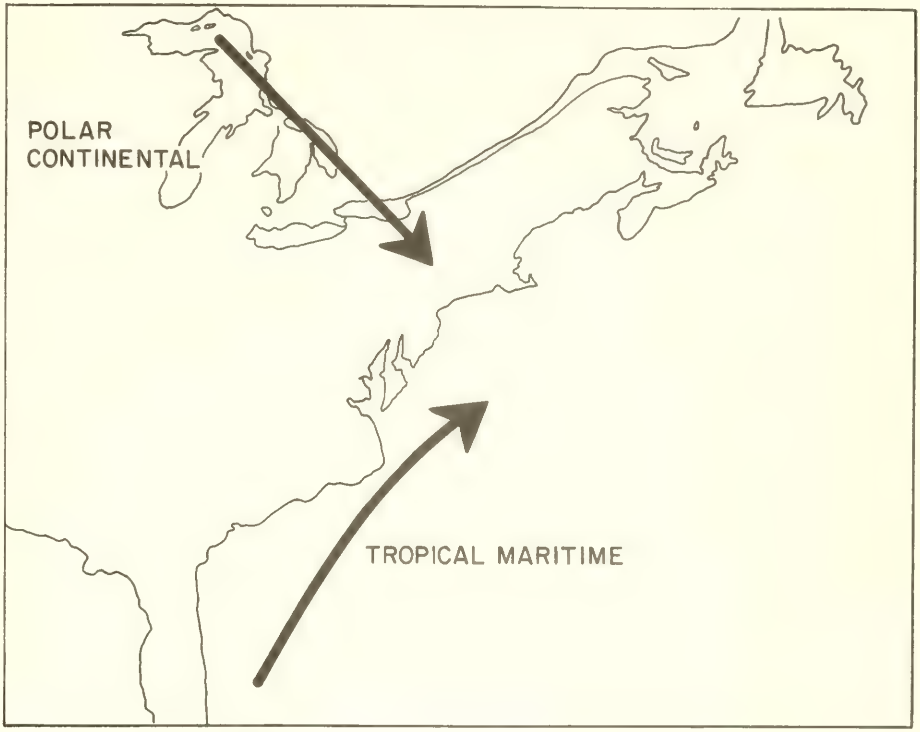


FIGURE 5.1-1

GENERAL MOVEMENT OF AIR MASSES WHICH FREQUENTLY AFFECT NEW ENGLAND

NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

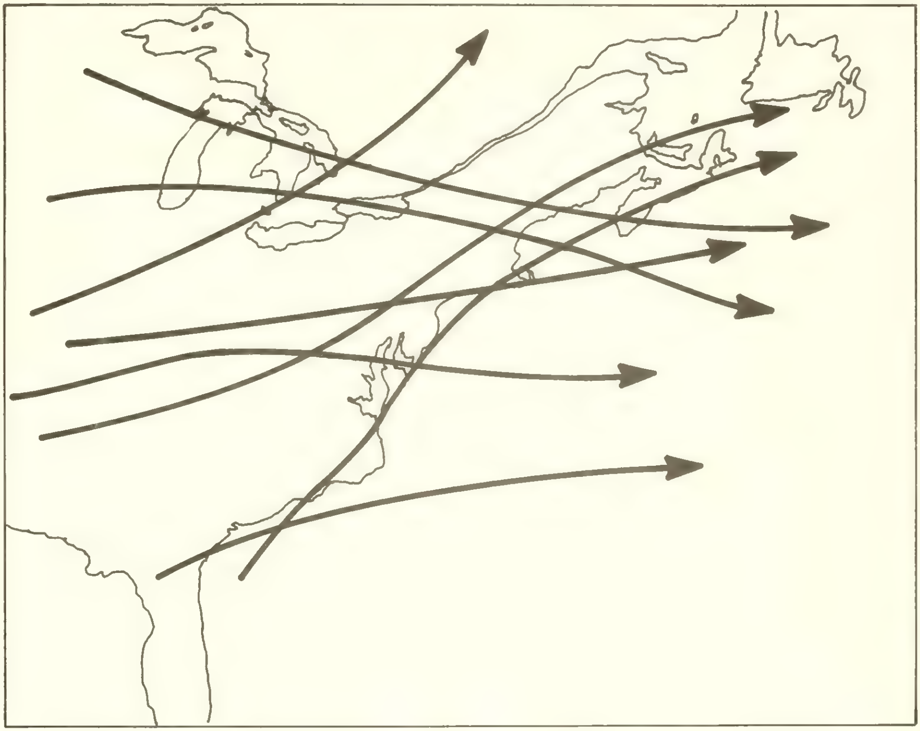


FIGURE 5.1-2

TYPICAL TRACKS OF LOW-PRESSURE SYSTEMS AFFECTING NEW ENGLAND

NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

5.2 METEOROLOGY

5.2.1 Precipitation

The annual average precipitation at Boston for the period of 1941 through 1980 was 42.52 inches with amounts ranging from as low as 23.71 inches in 1965 to as high as 62.32 inches in 1954. A maximum 24-hour value of 8.40 inches occurred in August 1955. Table 5.2-1 lists minimum and maximum monthly precipitation statistics for Boston, Massachusetts. Table 5.2-2 presents the average monthly and seasonal precipitation values. Figure 5.2-1 shows average annual precipitation at Boston for each of the years from 1941 through 1980.

The first measurable snowfall of winter usually occurs about the end of November, and the last snowfall in spring is generally near the middle of March. The average annual snowfall is 42 inches, with amounts ranging from as low as 10.3 inches in 1972-1973 to as high as 89.2 inches in 1947-1948. Average monthly snowfall values are presented in Table 5.2-2. A monthly maximum snowfall of 41.3 inches occurred in February 1969.

5.2.2 Temperature

The mean annual temperature is about 50°F, but seasonal variations bring tropical warmth of 90°F in the summer and polar cold of 0°F in winter. The coldest months are January and February, averaging about 29°F. The record minimum temperature of -12°F was recorded in January 1957. July and August average near 70°F, with a record maximum temperature of 102°F recorded in July 1977. Freezing temperatures occur on an average of 99 days per year from mid-November through March, and very warm days of 90°F or higher average 13 occurrences annually. The average daily maximum and minimum temperature values by month and season are presented in Table 5.2-2.

5.2.3 Fog

Heavy fog is not uncommon at Boston, but usually lasts less than a day. Contrasting temperature differences over the North Atlantic Ocean often create large fog banks which can move inland across southeastern New England any time of the year. The fog can lower visibility to 1/4 mile or less. Such dense fog occurs on the average of two times per month.

5.2.4 Relative Humidity

The annual average relative humidity at Boston is 67 percent. The average of the highest daily relative humidity values is 72 percent. These highest daily values are experienced at night and during early morning hours. The drier afternoon and evening hours average 58 percent and 65 percent at 1 pm and 7 pm, respectively.

5.2.5 Wind Speed and Direction

Figure 5.2-2 depicts the annual frequency distribution of wind direction at Boston. The most frequent (11.8 percent) wind direction is west-northwest and the least frequent (2.3 percent) wind direction is south-southeast. Figures 5.2-3 through 5.2-6 present the seasonal frequencies of wind direction at Boston. During the winter season (December - February), the wind is predominately from the west-northwest with winds blowing from the west through (clockwise) northwest approximately 45 percent of the time. During the spring (March - May), the most frequent (11.5 percent) wind direction is still the west-northwest. However, the frequency of wind directions from the northeast through (clockwise) southeast is significantly increased from winter because of the sea breeze phenomenon. The most prevalent (11.4 percent) wind direction during the summer is west-southwest, with the winds blowing from the south through (clockwise) west almost half (48 percent) of the time. The effect of the sea breeze on the summer frequency distribution is evident with a pronounced secondary maximum (19.5 percent) occurring between east and southeast. During the fall, the prevalent (10.6 percent) wind direction is west.

Annual and seasonal occurrences of wind persistence episodes per wind direction are presented in Tables 5.2-3 through 5.2-7. A wind persistence episode is defined as a period of consecutive hours when the wind is blowing from a particular direction. The maximum wind persistence episode for Boston was 32 consecutive hours, associated with a wind direction from the north during the fall of 1978. Forty-five percent of all annual wind persistence episodes equal to or greater than 12 hours duration occur in the winter season. This contrasts with only 11 percent during the summer season.

The annual average hourly wind speed is 12.6 mph. Calm conditions are infrequent (0.3 percent). Average monthly and seasonal wind speeds are summarized in Table 5.2-2. Wind speeds are highest during the winter, reflecting the increase in the frequency of intense storms affecting New England. Wind speeds are lowest during the summer, which is the period that lacks organized large scale storm activity, although high wind gusts can occur during this season as a result of localized thunderstorm activity.

Table 5.2-8 presents seasonal and annual wind speeds per wind direction. A west-northwest wind direction is associated with the highest average wind speed of 13.9 mph, and a south-southeast wind is associated with the lowest wind speed of 8.5 mph. These directions correspond with the highest and lowest average wind speed directions of the winter season.

TABLE 5.2-1

MONTHLY PRECIPITATION EXTREMES FOR BOSTON 1941-1980

Month	Minimum Monthly Precipitation in Inches and Year of Occurrence		Maximum Monthly Precipitation in Inches and Year of Occurrence	
Jan	0.74	1980	10.55	1979
Feb	0.88	1980	7.08	1969
Mar	1.48	1962	11.00	1953
Apr	1.24	1966	7.82	1958
May	0.53	1964	13.38	1954
June	0.48	1953	8.63	1959
July	0.52	1952	8.12	1959
Aug	0.83	1972	17.09	1955
Sept	0.35	1957	8.31	1954
Oct	0.96	1967	8.68	1962
Nov	0.64	1976	8.18	1969
Dec	0.97	1980	9.74	1969

Minimum yearly precipitation: 23.71 inches (1965)
Maximum yearly precipitation: 62.32 inches (1954)
Average yearly precipitation: 42.52 inches

SOURCE:

Department of Commerce, National Oceanic and Atmospheric Administration: Local Climatological Data Annual Summary with Comparative Data, 1980, for General Logan International Airport, Boston, MA. 1980.

TABLE 5.2-2

MONTHLY AND SEASONAL CLIMATIC SUMMARY OF BOSTON, MASSACHUSETTS

Month or Season	Average Daily Maximum Temperature (°F)	Average Daily Minimum Temperature (°F)	Average Precipitation (inches)	Average Snowfall (inches)	Average Wind Speed (mph)
December	39.3	26.6	4.18	7.8	13.7
January	35.9	22.5	3.89	12.4	14.3
February	37.5	23.3	3.43	11.9	14.1
Winter	37.6	24.1	11.50	32.1	14.0
March	44.6	31.5	3.90	8.0	13.9
April	56.3	40.8	3.46	0.7	13.3
May	67.1	50.1	3.45	Trace	12.2
Spring	56.0	40.8	10.81	8.7	13.1
June	76.6	59.3	3.04	0.0	11.4
July	81.4	65.1	2.71	0.0	10.9
August	79.3	63.3	3.50	0.0	10.7
Summer	79.1	62.6	9.25	0.0	11.0
September	72.2	56.7	3.20	0.0	11.3
October	63.2	47.5	3.13	Trace	12.1
November	51.7	38.7	4.23	1.2	12.9
Fall	62.4	47.6	10.56	1.2	12.1

Data Periods:

Average Daily Maximum and Minimum Temperature (1941-1970)
Average Precipitation and Snowfall (1941-1980)
Average Wind Speed (1958-1980)

SOURCE:

Department of Commerce. National Oceanic and Atmospheric Administration: Local Climatological Data Annual Summary with Comparative Data, 1980, for General Logan International Airport, Boston, MA. 1980.

TABLE 5.2-3

ANNUAL OCCURRENCES OF WIND PERSISTENCE EPISODES

PERIOD: 1/1/70 - 12/31/81

CONSECUTIVE HOURS OF PERSISTENCE

WIND FROM	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	TOTAL
N	621	312	185	94	62	49	34	20	17	8	5	4	1	5	6	2	4	2	0	1	2	0	0	0	0	0	1	1	0	0	1	1437
NNE	342	96	51	21	12	10	2	1	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	539
NE	376	151	64	42	25	8	9	5	6	3	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	693
ENE	399	180	91	37	23	9	13	8	7	1	2	1	3	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	777
E	628	296	161	109	64	38	21	18	7	4	4	3	2	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1358
ESE	525	316	139	82	54	30	10	11	2	2	2	2	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1178
SE	532	171	73	20	10	4	6	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	818
SSE	316	69	23	13	9	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	432
S	776	366	170	111	66	45	21	13	12	7	2	2	0	1	1	0	1	1	1	0	0	0	2	0	0	0	0	0	0	0	0	1598
SSW	695	305	144	89	34	22	12	7	2	0	4	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1320
SW	780	329	149	66	29	27	9	9	2	2	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1405
WSW	963	468	263	151	90	56	38	30	17	11	9	7	5	1	2	2	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2117
W	1122	544	325	185	109	75	42	29	20	20	13	8	3	5	3	2	2	2	0	0	0	1	0	0	0	0	0	0	0	1	0	2511
WNW	1249	595	337	209	116	71	42	16	21	7	11	8	6	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2696
NW	1097	476	255	130	87	42	30	15	21	11	4	4	6	3	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2184
NNW	718	251	123	57	33	8	15	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1211
TOTAL	11,139	4925	2553	1416	823	495	304	185	140	78	59	43	30	27	17	7	11	6	1	2	3	1	2	0	1	1	2	1	0	1	1	22,274

TABLE 5.2-4

WINTER OCCURRENCES OF WIND PERSISTENCE EPISODES

PERIOD: 1/1/70 - 12/31/81

CONSECUTIVE HOURS OF PERSISTENCE

WIND FROM	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTAL
N	179	86	59	29	19	17	22	6	7	4	2	2	1	2	5	0	4	1	0	1	1	0	0	0	0	0	1	1	0	0	449
NNE	81	19	11	7	1	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	124
NE	52	22	6	6	4	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93
ENE	49	18	8	7	2	2	2	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91
E	55	39	20	13	6	1	3	3	2	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	149
ESE	64	30	11	8	6	2	1	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	127
SE	67	22	3	7	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103
SSE	61	19	7	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95
S	129	63	24	26	13	11	7	3	3	3	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	284
SSW	111	40	20	15	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	194
SW	148	56	27	16	3	5	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	260
WSW	187	112	69	43	24	20	10	10	6	5	5	2	2	1	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	501
W	313	175	84	52	39	26	14	5	9	11	8	2	2	2	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1	747
WNW	440	203	121	81	49	29	20	3	9	3	8	3	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	978
NW	371	171	93	52	39	17	15	9	9	6	3	3	3	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	794
NNW	222	100	38	16	12	3	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	401
TOTAL	2529	1175	601	383	224	142	107	49	48	35	28	16	13	11	9	1	7	2	1	2	1	1	1	0	1	0	1	1	0	1	5390

TABLE 5.2-5

SPRING OCCURRENCES OF WIND PERSISTENCE EPISODES

PERIOD: 1/1/70 - 12/31/81

CONSECUTIVE HOURS OF PERSISTENCE

WIND FROM	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	TOTAL
N	141	83	46	21	11	8	4	2	4	0	1	0	0	0	1	2	0	0	0	0	0	0	0	0	324
NNE	98	31	20	6	6	4	2	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	171
NE	131	46	28	14	10	3	2	2	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	242
ENE	142	61	32	15	7	2	7	5	2	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	276
E	212	96	65	33	20	16	10	4	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	464
ESE	150	95	48	25	20	10	3	5	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	360
SE	135	40	23	1	0	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204
SSE	82	19	6	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	113
S	166	89	52	23	22	9	6	5	3	2	1	1	0	0	0	0	1	1	0	0	0	0	0	0	381
SSW	157	70	40	22	12	5	5	1	0	0	1	2	0	0	1	0	0	0	0	0	0	0	0	0	316
SW	162	74	30	15	8	7	2	3	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	304
WSW	180	85	45	24	9	10	5	4	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	367
W	286	129	85	55	24	16	12	9	4	5	3	3	1	2	0	0	1	0	0	0	0	0	0	0	635
WNW	306	150	85	53	26	17	8	5	4	1	1	2	2	2	0	0	0	0	0	0	0	0	0	0	662
NW	277	124	64	36	19	11	6	5	3	2	1	1	3	1	1	0	0	0	0	0	0	0	0	0	554
NNW	165	60	25	13	8	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	276
TOTAL	2790	1252	694	360	203	120	77	51	36	16	12	13	9	7	4	2	2	1	0	0	0	0	0	0	5649

NEW BOSTON STATION - DEIR

TABLE 5.2-6

SUMMER OCCURRENCES OF WIND PERSISTENCE EPISODES

PERIOD: 1/1/70 - 12/31/81

CONSECUTIVE HOURS OF PERSISTENCE

WIND FROM	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	TOTAL
N	131	53	28	15	14	5	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	251
NNE	64	21	10	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
NE	84	35	12	6	3	1	2	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	146
ENE	96	42	19	8	2	3	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	174
E	212	91	47	34	24	9	5	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	428
ESE	184	115	48	30	20	13	6	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	420
SE	195	68	28	10	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	308
SSE	81	12	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96
S	297	122	60	36	19	6	3	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	547
SSW	272	113	53	29	15	10	2	2	1	0	3	0	1	1	0	0	0	0	0	0	0	0	0	0	502
SW	290	108	54	20	8	5	2	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	491
WSW	355	132	76	45	25	13	7	8	4	3	1	2	0	0	0	1	1	1	0	0	0	0	0	0	674
W	265	124	73	37	15	12	5	6	3	2	1	1	0	0	1	1	0	1	0	0	0	0	0	0	547
WNW	229	103	59	27	15	7	7	3	3	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	456
NW	185	74	39	16	10	6	1	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	336
NNW	127	38	22	9	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	201
TOTAL	3067	1251	629	327	178	93	45	35	23	5	7	5	2	3	1	2	1	2	0	0	0	0	1	0	5677

TABLE 5.2-7

FALL OCCURRENCES OF WIND PERSISTENCE EPISODES

PERIOD: 1/1/70 - 12/31/81

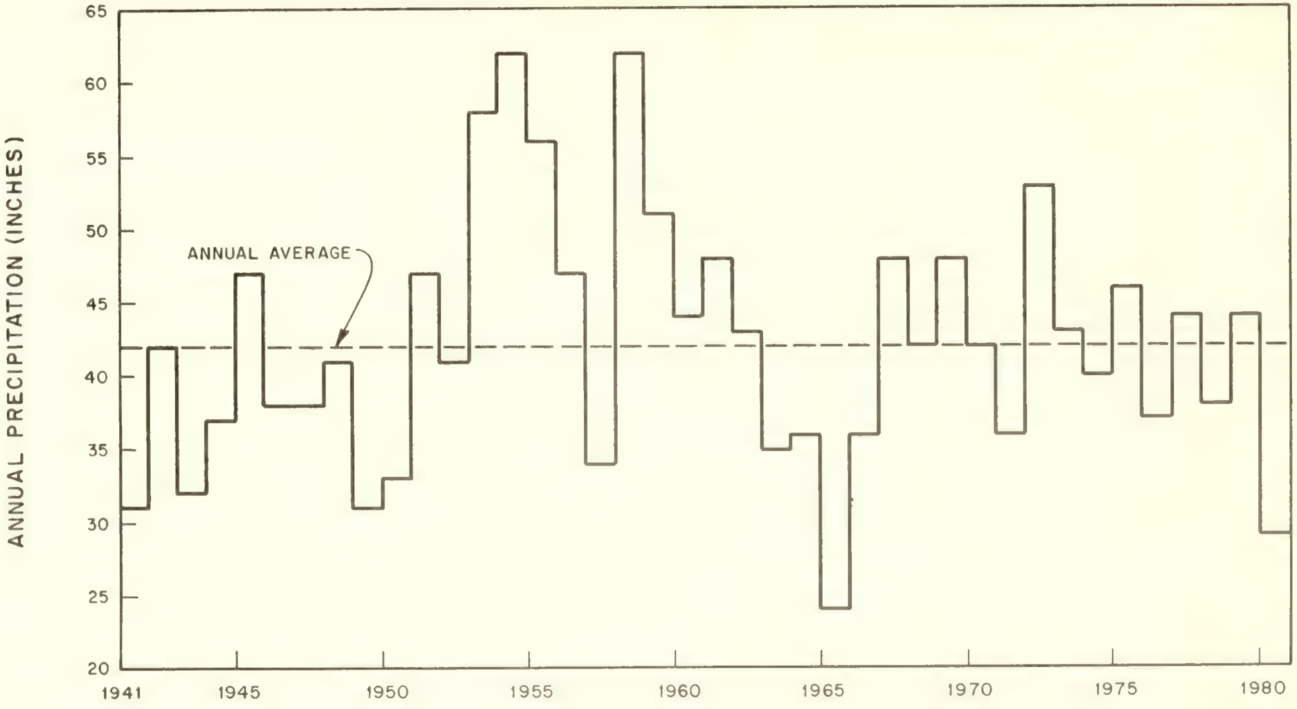
CONSECUTIVE HOURS OF PERSISTENCE

WIND FROM	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	TOTAL
N	178	98	54	34	19	18	7	9	5	4	2	2	0	3	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	436
NNE	107	28	11	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	156
NE	114	51	19	17	8	3	4	2	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	222
ENE	120	63	31	7	12	3	3	3	1	1	1	0	2	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	249
E	168	75	35	31	15	13	4	7	0	1	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	353
ESE	135	86	39	19	9	7	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	299
SE	152	44	20	3	2	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	225
SSE	94	20	9	2	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	131
S	197	96	37	28	11	18	5	4	5	2	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	406
SSW	161	87	33	24	5	6	3	3	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325
SW	190	93	43	16	11	9	3	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	368
WSW	254	146	73	43	31	14	16	8	3	3	3	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	599
W	276	124	89	42	32	21	12	9	5	3	1	2	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	619
WNW	283	141	72	49	27	18	8	6	5	3	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	615
NW	282	112	59	28	19	8	8	0	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	525
NNW	210	53	40	20	11	3	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	342
TOTAL	2921	1317	664	368	222	143	79	53	34	23	13	9	6	6	3	2	1	1	0	0	2	0	0	0	0	1	1	0	0	0	1	5870

TABLE 5.2-8

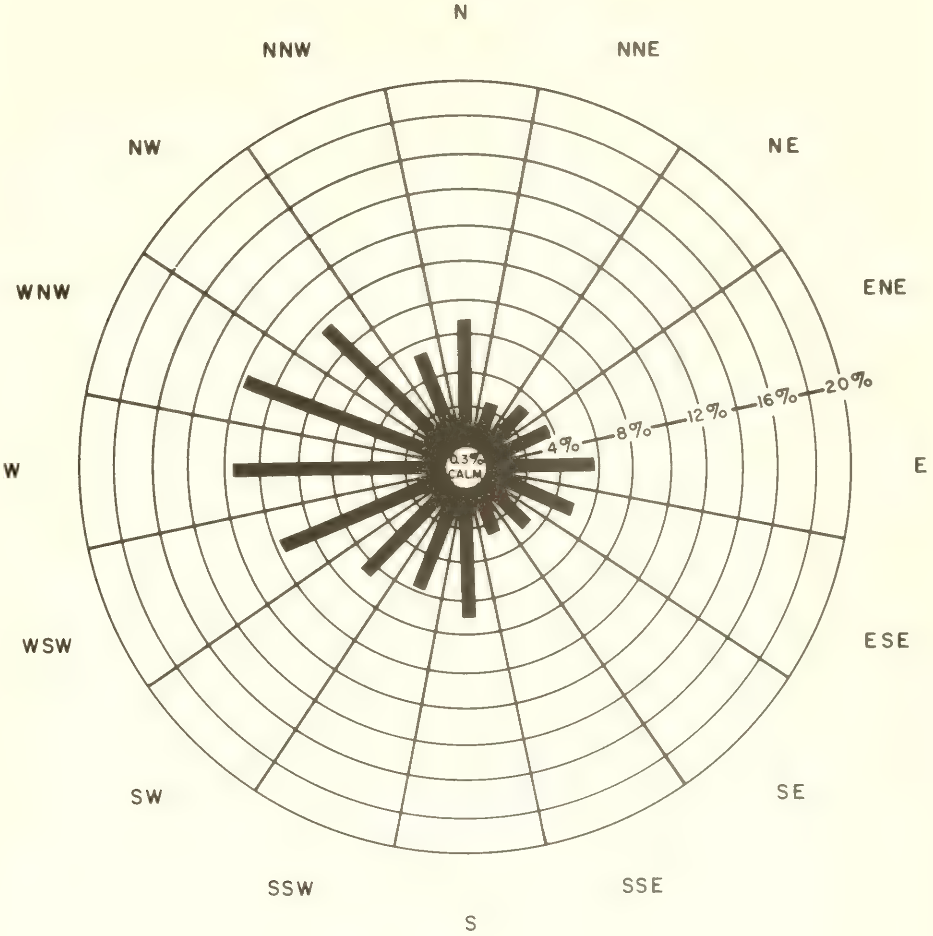
SEASONAL AND ANNUAL AVERAGE WIND SPEED (MPH) PER WIND DIRECTION AT LOGAN AIRPORT (1970-1981)

Wind Direction	Winter	Spring	Summer	Fall	Annual
N	11.5	10.8	8.6	10.0	10.4
NNE	10.3	11.1	8.5	9.7	10.0
NE	12.5	12.9	10.5	12.0	12.0
ENE	14.5	12.0	9.1	11.5	11.5
E	14.0	11.6	9.7	11.0	11.1
ESE	11.5	11.7	10.2	10.3	10.8
SE	9.4	9.0	8.2	9.0	8.8
SSE	9.1	8.9	7.3	8.7	8.5
S	10.9	10.8	9.7	9.9	10.2
SSW	13.2	13.3	11.7	12.0	12.4
SW	13.4	12.7	11.5	12.0	12.2
WSW	13.5	12.1	11.1	12.1	12.1
W	15.4	14.7	11.1	13.5	13.8
WNW	15.5	14.6	11.2	13.0	13.9
NW	14.0	13.3	10.8	12.2	12.9
NNW	12.2	12.4	10.4	11.0	11.6



SOURCE: Department of Commerce, 1980.
National Oceanic and Atmospheric Administration:
Local Climatological Data Annual Summary
With Comparative Data, 1980, for Logan
International Airport, Boston, MA.

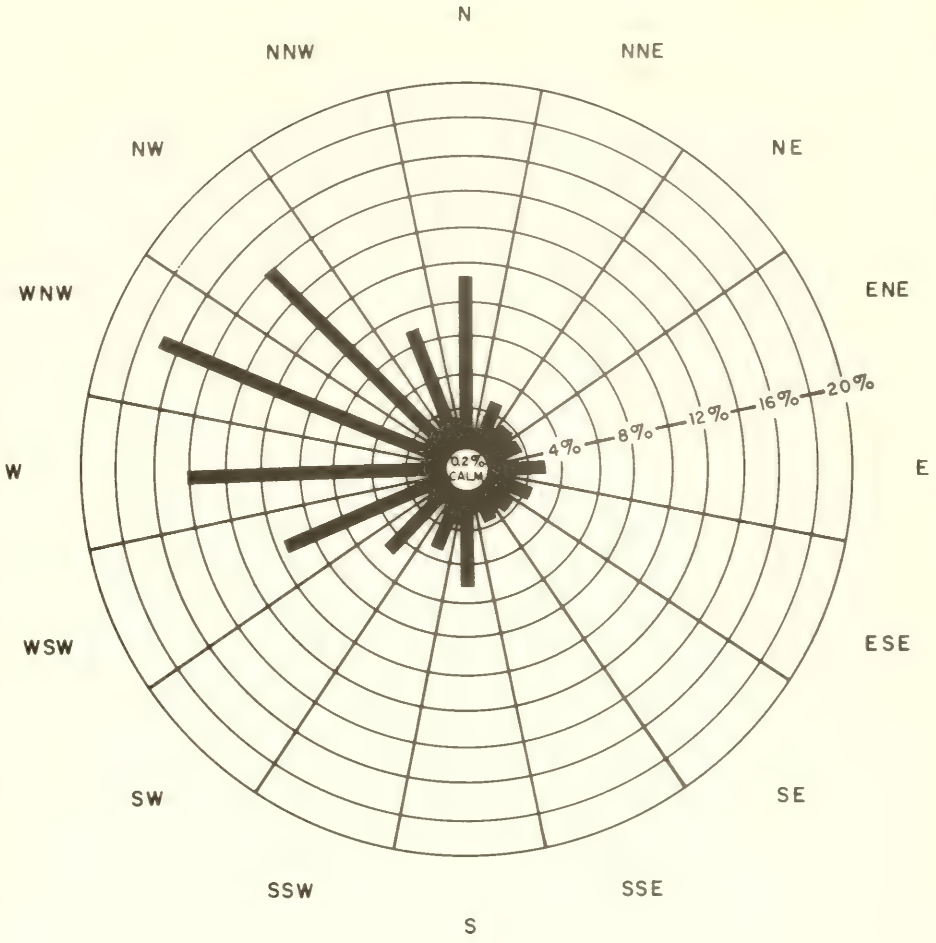
FIGURE 5.2-1
ANNUAL PRECIPITATION
AT BOSTON (1941-1980)
NEW BOSTON STATION
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTE
DIRECTION REPRESENTS SECTOR
FROM WHICH THE WIND BLOWS

FIGURE 5.2-2
ANNUAL FREQUENCY DISTRIBUTION (PERCENTAGE OCCURRENCE) OF WIND DIRECTION FOR BOSTON, MASSACHUSETTS (1970-1981)
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

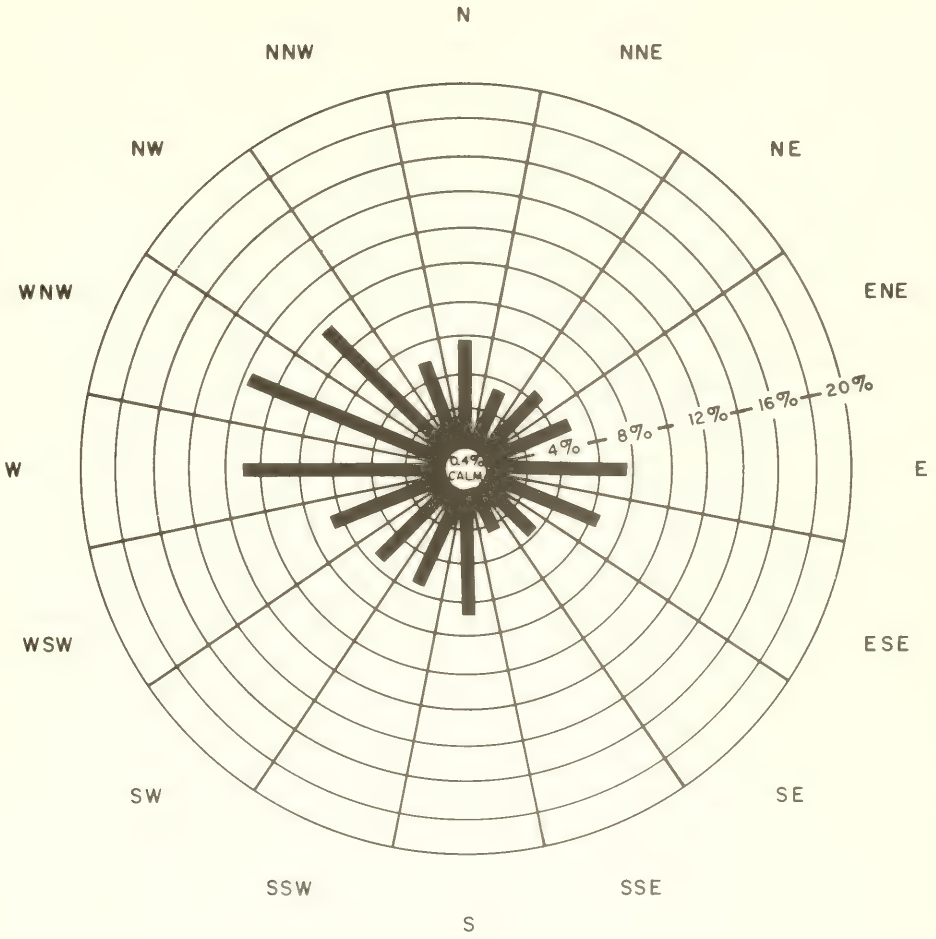
SOURCE: National Climatic Center
Asheville, NC.



NOTE
DIRECTION REPRESENTS SECTOR
FROM WHICH THE WIND BLOWS

SOURCE: National Climatic Center
Asheville, NC.

FIGURE 5.2-3
WINTER FREQUENCY DISTRIBUTION (PERCENTAGE OCCURRENCE) OF WIND DIRECTION FOR BOSTON, MASSACHUSETTS (1970-1981)
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

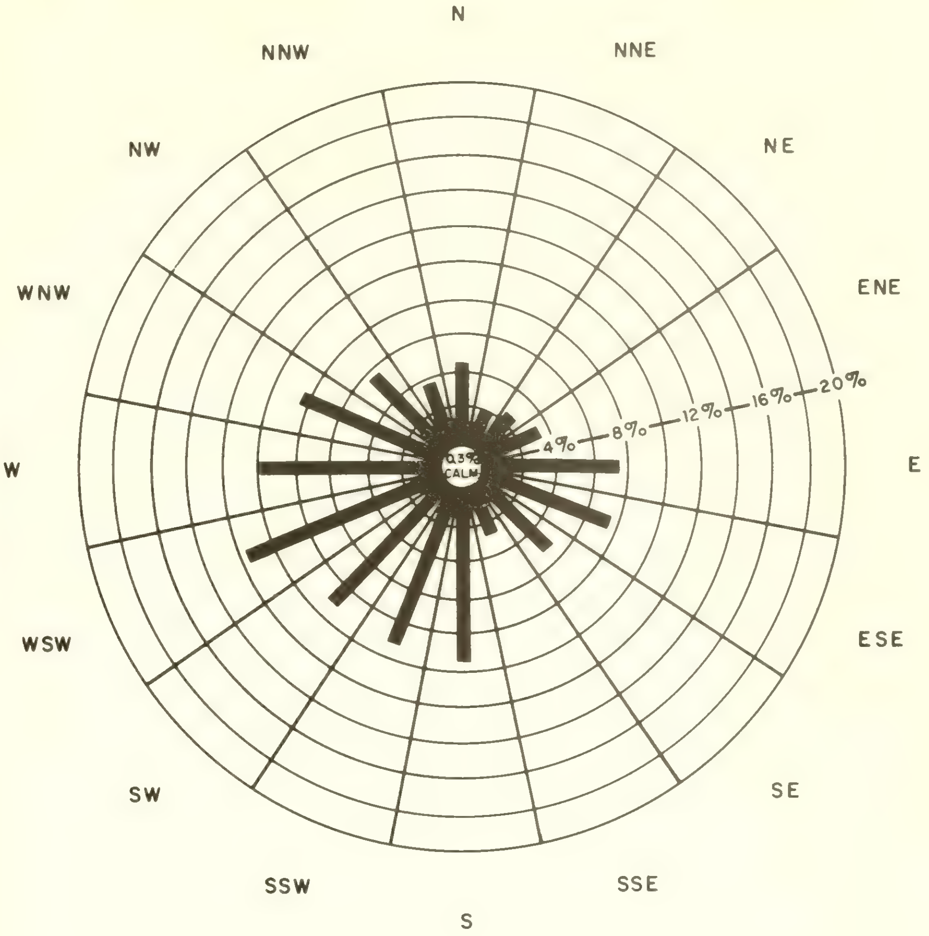


NOTE
DIRECTION REPRESENTS SECTOR
FROM WHICH THE WIND BLOWS

SOURCE: National Climatic Center
Asheville, NC.

FIGURE 5.2-4
SPRING FREQUENCY DISTRIBUTION (PERCENTAGE OCCURRENCE) OF WIND DIRECTION FOR BOSTON, MASSACHUSETTS (1970-1981)

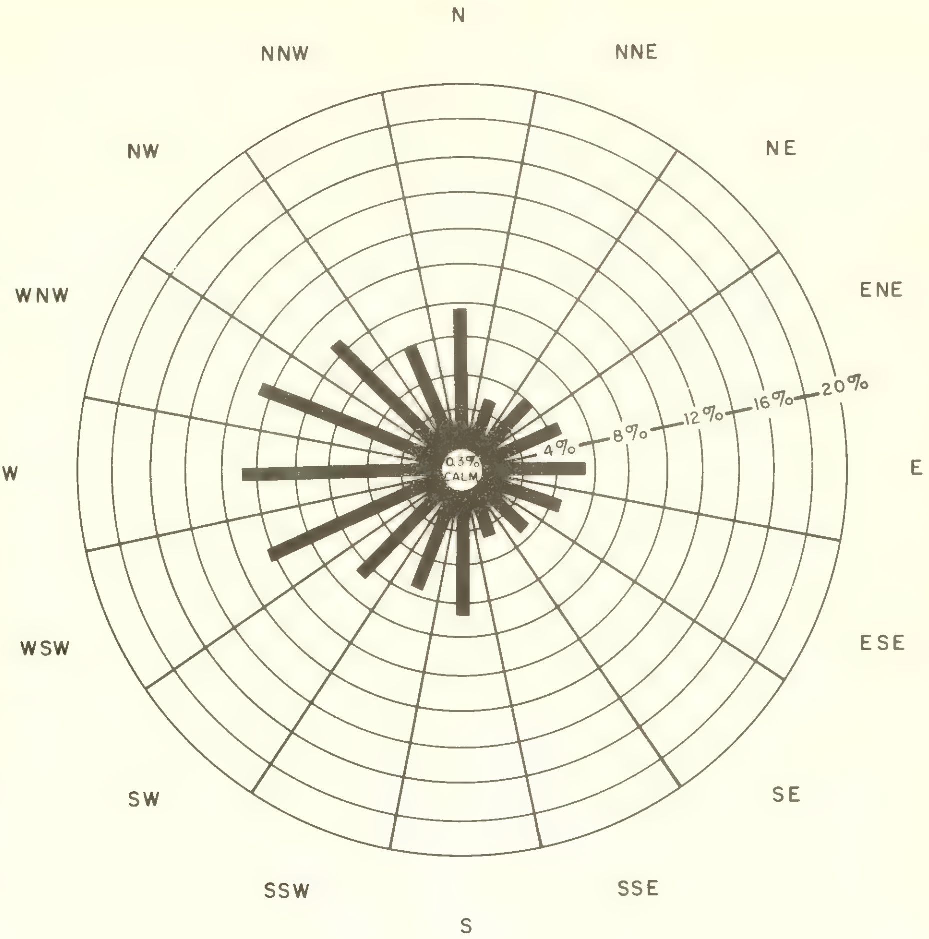
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTE
DIRECTION REPRESENTS SECTOR
FROM WHICH THE WIND BLOWS

SOURCE: National Climatic Center
Asheville, NC.

FIGURE 5.2-5
SUMMER FREQUENCY DISTRIBUTION (PERCENTAGE OCCURRENCE) OF WIND DIRECTION FOR BOSTON, MASSACHUSETTS (1970-1981)
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTE
DIRECTION REPRESENTS SECTOR
FROM WHICH THE WIND BLOWS

SOURCE: National Climatic Center
Asheville, NC.

FIGURE 5.2-6

FALL FREQUENCY DISTRIBUTION (PERCENTAGE OCCURRENCE) OF WIND DIRECTION FOR BOSTON, MASSACHUSETTS (1970-1981)

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

5.3 AIR QUALITY

Federal and state air pollution control to date has focused on the six major pollutants for which National Ambient Air Quality Standards (NAAQS) have been established in accordance with the Clean Air Act (CAA). Known as the criteria pollutants, the NAAQS include total suspended particulates (TSP), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and lead (Pb). Hydrocarbon standards were revoked on January 5, 1983 (48FR628). Primary standards are intended to safeguard human health by setting limits on the amount of pollution allowed in the surrounding air so as to protect the population with a significant margin of safety. The margin of safety is to ensure protection of more sensitive groups such as children, the elderly, and the sick. Secondary standards are set to protect public welfare by preventing adverse effects on animals, agricultural crops, man-made materials and property, personal comfort and well-being, and other factors. The degree of stringency of the primary standards, as opposed to the secondary standards, is based upon results of extensive health analyses.

Individual states must, under the CAA, adopt standards in their State Implementation Plans (SIPs) for the criteria pollutants that are at least as stringent as the NAAQS. Table 5.3-1 lists the Massachusetts and National Ambient Air Quality Standards. The primary method of ensuring the standards are attained and maintained is through control of emissions of these pollutants, specifically from mobile and stationary sources.

In addition to criteria pollutants, the CAA requires control of other airborne compounds and radionuclides. Known as the noncriteria pollutants, regulation of these substances has been significantly slower than that of the criteria pollutants. This is due in large part to the uncertainty associated with the origin of their emissions, the atmospheric chemistry involved during transport, and the significance, if any, of their health effects.

Determination of progress being achieved in attaining and/or maintaining the NAAQS is accomplished through ambient air quality monitoring. Under the CAA, the state must provide ambient air quality monitoring at selected locations within specified areas under its jurisdiction known as Air Quality Control Regions (AQCRs). The state must make available on an annual basis the present ambient conditions on a pollutant-specific basis. In addition to the state-operated network, ambient monitoring data are also collected by local agencies, corporations, universities, etc.

New Boston Station is located in the state-designated Metropolitan Boston Air Pollution Control District and the federally-designated Metropolitan Boston Air Quality Control

Region (AQCR 119). Ambient air quality monitoring data representative of the region surrounding New Boston Station were obtained from the Massachusetts Department of Environmental Quality Engineering (DEQE), Boston Edison Company (BECO), United States Environmental Protection Agency (EPA), and Harvard University. In the analysis of existing ambient air quality concentrations and the major source emissions inventory, a 20 km radius (hereafter referred to as 12.4 miles) from New Boston Station was identified as the area most representative of Metropolitan Boston.

The ambient air quality data presented in this section are generally inclusive of the period from 1978 through 1981 for criteria and noncriteria pollutants. However, data collected prior to 1978 are included, if available, for those pollutants with insufficient representative data in subsequent years (e.g., trace elements). Data from all known monitoring sites within 12.4 miles of New Boston Station have been analyzed and tabulated. Table 5.3-2 lists monitoring sites, station identification [Storage and Retrieval of Aerometric Data (SAROAD)] numbers, operators, pollutants monitored, and Universal Transverse Mercator (UTM) coordinates. Figure 5.3-1 depicts the location of all known monitoring sites relative to New Boston Station. The ambient air quality, New Boston Station emissions, and future trends in air quality are discussed below.

5.3.1 Criteria Pollutants

5.3.1.1 Ambient Air Quality Data for Criteria Pollutants

Ambient air quality data summaries are provided below for each criteria pollutant. Existing air quality concentrations are compared to the appropriate ambient air quality standards shown in Table 5.3-1. In addition, a summary of the area's attainment status on a pollutant-specific basis is provided. Table 5.3-3 contains a summary of the current EPA attainment status designations within 12.4 miles of New Boston Station for each criteria pollutant. Figure 5.3-2 depicts the areas designated as not in attainment of standards. A description of trends in ambient levels in the past decade for the Metropolitan Boston airshed is also provided.

An investigation into major sources of air pollutants in South Boston (as well as the rest of Metropolitan Boston) was performed to assess qualitatively whether ambient air quality concentrations in South Boston might be unduly affected by local emissions relative to the remainder of the Metropolitan Boston airshed. It is concluded in the following subsections that ambient concentrations in South Boston are similar to concentrations recorded elsewhere in the urban core.

Total Suspended Particulates (TSP)

A summary of TSP ambient air quality data is presented in Table 5.3-4. Although there were several violations of the TSP standards within 12.4 miles of New Boston Station during 1978 and 1979, no violations were recorded in either 1980 or 1981. The primary annual standard of 75 ug/m³ and the secondary 24-hour standard of 150 ug/m³ were violated at the Kenmore Square monitoring station in Boston during 1978. The secondary annual standard of 60 ug/m³ is used only as a guide in assessing implementation plans to achieve the 24-hour standard (40CFR50.7(a)). In addition, the secondary 24-hour standard was violated during 1978 at the Main and Moody Street monitoring station located in Waltham, and during 1979 at the Chestnut and Sixth Street monitoring station located in Chelsea. TSP monitoring was discontinued in 1978 at the Kenmore Square and Main and Moody Street stations due to the unrepresentativeness of collected data from these stations, as opposed to the general background data. DEQE determined that both sites were unduly influenced by reentrainment of road dust, and therefore, TSP concentrations were not a result of stationary source impacts.

No ambient data depicting actual TSP concentrations in South Boston are available. However, there are no known sources of particulate matter in South Boston that would cause ambient levels of TSP to vary significantly from concentrations recorded in the remainder of the Metropolitan Boston airshed.

In a study performed in 1977 to determine the elemental composition of TSP in Metropolitan Boston, it was reported that between 51 and 59 percent of all particulates originate from the soil and are entrained into the atmosphere by vehicle activity, construction and demolition, and the action of the wind (Wiltsee 1977). In addition, it was determined that residual oil fuel combustion from all sources contributes only 2 to 5 percent of the TSP concentrations in Metropolitan Boston.

Despite the recent attainment of the TSP standards in Metropolitan Boston, as demonstrated by the monitoring data, EPA attainment status designations still show several areas classified as not meeting secondary standards. Originally designated as an area of non-attainment of TSP standards (43FR9002), the entire City of Boston, including New Boston Station site, has since been redesignated as "cannot be classifed" (45FR2306 et seq). This designation is reserved for areas where insufficient or unrepresentative monitoring data exist to warrant an attainment or non-attainment designation. The current TSP EPA attainment status of the Metropolitan Boston area is shown in Table 5.3-3 and Figure 5.3-2.

Long-term air quality trend analyses have been performed by EPA and DEQE (EPA 1975; EPA Annual Reports, 1976-1980; DEQE 1978).

From these analyses, trends in ambient TSP concentrations in Metropolitan Boston for the period from 1971 to 1981 can be evaluated. Annual geometric mean concentrations of TSP have exhibited a general downward trend for the period analyzed. Specifically, average geometric mean concentrations fell from 73 ug/m³ in 1971 to 49 ug/m³ in 1974. Since 1974, average geometric mean concentrations have decreased more slowly to 45 ug/m³ in 1981. This decrease over 10 years can be attributed in part to the implementation of restrictive SIP requirements.

Respirable Particulate Matter (RPM)

Respirable particulate matter (RPM) is defined in most air quality literature as particulate matter with a small aerodynamic diameter, capable of being deposited in the human lung. Although no universal cutoff on the size of particulate matter in categorizing RPM has been established, EPA's Health Effects and Environmental Science Research Laboratories have recommended to EPA's Office of Air Quality Planning and Standards a maximum particulate diameter of 2.5 microns in setting a size-specific RPM ambient standard (EPA 1981). However, no ambient air quality standard presently exists for RPM.

Ambient RPM data representative of concentrations in Metropolitan Boston are limited to a 2-year, one-station monitoring program in Watertown. Results of dichotomous particulate sampling conducted by Harvard University between May 1979 and April 1981 show a 221 sample average of RPM equivalent to 17.1 ug/m³ (Spengler 1982). This is equivalent to 34.4 percent of the simultaneously monitored TSP average concentration of 49.7 ug/m³. This RPM/TSP ratio reaffirms the conclusion reached by EPA that between 30 and 35 percent of urban TSP is of a 2.5-micron diameter or less (EPA 1981).

An analysis of RPM on a monthly basis shows that the RPM concentrations in Watertown vary by 25 percent between summer and winter, with the higher levels recorded during summer. Seasonal variations are attributed to the interaction of fine particulate sources, meteorology, and atmospheric chemistry.

Sulfur Dioxide (SO_2)

Ambient monitoring data for SO_2 are summarized in Table 5.3-5. There were no violations of either the 3-hour, 24-hour, or annual ambient standards of 1300 ug/m³, 365 ug/m³, and 80 ug/m³, respectively, at any site within 12.4 miles of New Boston Station during the period from 1978 through 1981. In fact, the highest concentrations recorded (i.e., Kenmore Square monitoring station) were less than 70 percent of the standards. It is clear that SO_2 concentrations within 12.4 miles of New Boston Station are well within all standards. Although no ambient SO_2 data specific to South Boston have been recorded, there is no reason to believe that ambient concentrations in this area vary significantly from the range in concentrations experienced elsewhere in Metropolitan Boston. The ambient data are in agreement with the regional EPA attainment status designation shown in Table 5.3-3.

An evaluation of trends of SO_2 concentrations in Metropolitan Boston shows that regional levels fell consistently from 1971 to 1974, with the steepest decline occurring in the urban core. Annual average concentrations for the entire Metropolitan Boston area fell from 41 ug/m^3 in 1971 to 18 ug/m^3 in 1974. At the same time, SO_2 concentrations in downtown Boston declined from 63 ug/m^3 in 1971 to 19 ug/m^3 in 1974.

The dramatic decrease in annual average SO_2 concentrations between 1971 and 1974 was a result of sulfur-in-fuel regulations. Because of the lower SO_2 ambient levels in 1974 and the increased cost of low-sulfur fuel oil, new legislation (Massachusetts General Laws of 1974, Chapter 494) allowed utilities and industries meeting specific stringent conditions (e.g., protection of standards and public health) to burn higher sulfur fuel oil. As a result, ambient SO_2 levels increased slightly between 1975 and 1978, but remained well within all ambient standards.

Since 1978, the overall annual average SO_2 concentrations in Metropolitan Boston have consistently remained between 33 and 36 ug/m^3, which is only 40 to 45 percent of the annual standard. However, concentrations did vary significantly from station-to-station. Kenmore Square monitoring station, for example, has consistently recorded annual average concentrations between 50 and 55 ug/m^3, while concentrations recorded at Long Island ranged between 22 and 26 ug/m^3.

Nitrogen Dioxide (NO_2)

A summary of annual NO_2 ambient data from 1978 to 1981 is provided in Table 5.3-6. No NO_2 monitoring station within 12.4 miles of New Boston Station recorded a violation of the annual standard of 100 ug/m^3. Annual average concentrations of NO_2 in South Boston are in all likelihood well within the standard. The entire region is currently designated as "cannot be classified or better than national standards" for NO_2.

In addition to the state and federal standard for annual average concentrations, Massachusetts DEQE has followed its own policy for short-term NO_2 concentrations applicable to new or modified major sources of oxides of nitrogen (NOx). Specifically, new or modified major sources of NOx that increase emissions to the atmosphere by more than 250 tons per year must demonstrate that the operation of the source will not, with consideration of ambient background, cause or significantly contribute to NO_2

concentrations in excess of 320 ug/m³ for any 1-hour period on more than 1 day per year.

Highest and second highest 1-hour average NO_2 concentrations are provided in Table 5.3-6. Concentrations recorded at 590 Commonwealth Avenue (Kenmore Square) and Visconti Street (Callahan Tunnel) show consistent violations of the Massachusetts 1-hour guideline of 320 ug/m³. As a result, these two NO_2 monitoring locations, which reflect heavy mobile source traffic patterns, have been designated by DEQE as "hot spots."

Ambient levels of NO_2 are primarily a result of NOx emissions from motor vehicles and stationary combustion sources. It is estimated that motor vehicle emissions constitute 45 percent of all NOx emissions, while stationary combustion sources contribute 50 percent. Electric utilities are responsible for approximately 56 percent of the NOx emissions from stationary combustion sources (EPA 1979). It follows, then, that approximately 30 percent of all NOx emissions are attributable to electric utilities. Because of their elevated stacks, stationary sources generally contribute far less to ground-level ambient concentrations of NO_2 than motor vehicles. This is readily apparent when one considers the location of the "hot spot" monitoring sites (i.e., Kenmore Square and Callahan Tunnel) relative to high traffic volume.

Determination of trends in NO_2 concentrations from 1971 to 1977 is more difficult to accomplish and conclusions are probably less reliable than for the other criteria pollutants due to the sparsity of the data base and the lack of continuous measurement equipment. However, DEQE believes, based on the available noncontinuous data, that the ambient concentrations at almost all its monitoring stations were in compliance with the annual standard of 100 ug/m³ for the period from 1971 to 1977 (DEQE 1978). In 1977, when continuous monitoring became more readily available, only those sites located close to heavily traveled roadways (i.e., the NOx source of most concern) were retained. From 1977 to 1981, the more reliable continuous monitoring data have not revealed any discernible trend in annual NO_2 concentrations. The only conclusion that can be made is that during this period annual NO_2 concentrations were in compliance with standards, and 1-hour maximum concentrations exceeded the state guidelines at the "hot spots."

Carbon Monoxide (CO)

Table 5.3-7 summarizes CO ambient air quality data from 1978 through 1981. No violation of the primary and secondary 1-hour standard of 40 mg/m³ was recorded at any station during the 4-year period analyzed. However, violations of the 8-hour standard of 10 mg/m³ have occurred at three monitoring sites in Boston, as well as at sites in Medford, Quincy, Cambridge, and

Waltham. Concentrations of CO at each of these sites more closely reflect the monitoring stations' proximity to heavy vehicular activity, the source of most CO emissions, than to general background levels. Because of frequent violations of the 8-hour standard, monitors located at 600 Washington Street, Kenmore Square, and the Callahan Tunnel in Boston; and Wellington Circle in Medford are designated by DEQE as "hot spots". The ambient data are in agreement with the EPA designated regional attainment status shown in Table 5.3-3 and Figure 5.3-2.

There is no reason to believe that existing general background concentrations of CO in South Boston vary significantly from the remainder of Metropolitan Boston. Existing concentrations at street level are in all probability well within the 1-hour standard. However, it is not unreasonable to assume that primarily because of vehicular activity, the 8-hour concentrations occasionally approach, or even exceed, the standard near the busier intersections, such as Dorchester Street at Broadway (Andrew Square), because of their traffic patterns.

Trend data for CO are available for the period from 1973 to 1981. These data are generally reported in terms of number of violations of the 8-hour standard and annual average concentrations (although no annual standards exist for CO). Results show a significant and continuous decrease in both the number of 8-hour violations and annual average concentrations in Metropolitan Boston throughout the period. This is directly attributable to the replacement of older, less efficient automobiles with newer models equipped with emission control systems. The continuous long-term decrease in CO concentrations is not totally unexpected since CO emissions are largely caused by automobile exhaust.

Ozone

Six monitoring stations within 12.4 miles of New Boston Station have collected ozone data during the 4-year period analyzed (1978-1981). Several violations of the ambient standard for ozone have occurred during 1978 through 1980, but no violations occurred during 1981. However, all ozone monitoring stations within 12.4 miles of New Boston Station were discontinued in 1981, with the exception of the Bremen Street, East Boston, site. The highest and second-highest 1-hour concentrations of ozone are listed in Table 5.3-8. The EPA attainment status designation lists the entire area as non-attainment.

Ozone is a widespread problem, not limited to any one specific area. Ozone is predominantly transported over great distances, and local violations are often the result of such transport. Because of the nature of the pollutant ozone, it can be concluded that concentrations in South Boston are within the range of concentrations recorded in the remainder of Metropolitan Boston.

Ozone concentrations are in large part due to the emissions of volatile organic compounds (VOCs), NOx, and, to a lesser extent, CO generated by transportation-related sources, in particular, the automobile. However, VOC emissions from industrial sources and NOx emissions from utility sources are also believed to contribute to ozone formation. Emissions of these pollutants in the presence of sunlight are believed to trigger photochemical oxidation leading to the production of ozone (EPA 1979). Although the detailed formation processes are not well known, traditional opinion in the scientific community is that ozone is formed in the stratosphere (i.e., above 7.5 miles) and transported to the ground in the vicinity of frontal zones or breaks in the tropopause, which separates the stratosphere from the troposphere (Danielson 1977). Hence, local emissions of the precursor pollutants are not thought to significantly contribute to local ozone concentrations, but are instead transported downwind while undergoing the photochemical oxidation process.

The attempt at reducing ozone concentrations in Metropolitan Boston and elsewhere is based on a cooperative effort by federal, state, and local agencies. The strategy is to limit emissions of the precursor pollutants, with emphasis placed on the control of automotive exhaust. However, progress achieved to date in reducing ozone concentrations through control strategies is difficult to discern. Analysis of trend data (1973 through 1981), generally reported in terms of number of standard violations per year, shows no clear trend in ambient concentrations of ozone. Annual variations in the number of recorded 1-hour violations appear to be more dependent upon meteorology than any significant change in precursor emissions.

Lead

Unlike the other criteria pollutants for which ambient standards were established during the early 1970s, the ambient standard for lead was promulgated in October 1978. The ambient standard is 1.5 ug/m^3, maximum arithmetic mean concentration averaged over a calendar quarter. In addition to the relatively recent promulgation of the lead standard, ambient air quality monitoring, data reporting, and surveillance provisions for this pollutant have been slow to evolve because of technical uncertainties. Primarily, as a result of this, the existing data base for lead is limited to two sites: 115 Southampton Street, Boston, and Oxford Street, Cambridge. Ambient monitoring data collected since 1976 at these two sites are presented in Table 5.3-9. No violations of the standard have been recorded at either monitoring site. Lead ambient standard attainment designations have not yet been promulgated for Massachusetts.

Lead is emitted to the atmosphere by vehicles burning leaded fuel and by certain stationary sources which include lead smelters, gasoline lead additive manufacturers, and lead storage battery manufacturers. In addition, trace quantities of lead can be emitted through the combustion of fuel oil and coal. Ambient concentrations of lead in Metropolitan Boston are almost exclusively the result of motor vehicle emissions.

Due to the sparsity of the data base for lead, a long-term trend analysis is not feasible. However, analysis of 5 years (1976 through 1980) of data monitored at the two existing sites has been performed. This analysis does not indicate any clear trend, although a slight improvement in ambient concentrations is discernible at the Oxford Street monitor. Since automobiles are the primary source of lead emissions in Metropolitan Boston and leaded gasoline utilized in automobiles has, for the most part, been phased out since 1970, it is likely that a decreasing trend in lead concentrations has occurred during the past decade.

5.3.1.2 Emissions of Criteria Pollutants from New Boston Station

Present emissions of criteria pollutants from New Boston Station, firing 1 percent sulfur fuel oil in Units 1 and 2, are in compliance with all requirements of the Massachusetts SIP. Specifically, the current SIP and associated regulation 310CMR7.02(8) limits particulate matter (PM) emissions from existing fossil fuel utilization facilities in critical areas of concern (the City of Boston is such an area) to 0.12 lb/MBtu heat input. For all other areas, the PM emission limit is 0.15 lb/MBtu heat input. The current PM emission rate at New Boston Station is approximately 0.034 lb/MBtu heat input, well within the SIP requirements.

The SIP and regulation 310CMR7.05(1)(d) limit SO_2 emissions by allowing a maximum sulfur-in-fuel content of 0.55 lb/MBtu heat release potential, in addition to a successful demonstration to DEQE showing that no ambient air quality standard would be violated. By firing 1.0 percent sulfur oil, New Boston Station is in compliance with the SIP. It is important to note that DEQE allows (with EPA approval) sulfur in fuel greater than 0.55 lb/MBtu, provided it is demonstrated that such an increase will not cause violation of the ambient air quality standards. EPA has approved the current SIP emission limitations for PM and SO_2 as a means to attain or maintain the NAAQS, as described in Section 5.3.1.1.

The emission rate of NOx from New Boston Station is approximately 0.43 lb/MBtu heat input. Currently, there is no emission standard for existing sources of NOx.

Table 5.3-10 provides a listing of the annual fuel oil usage at New Boston Station from 1973 through 1982. An estimate of the total annual emissions of the major power plant related pollutants (i.e., SO_2, PM, and NOx) is also provided. (Emission estimates of the remaining criteria pollutants, i.e., CO, lead, and VOC, are provided in Section 7.1.2.1) The annual usage, or capacity factor, of New Boston Station during the past 10 years has ranged from a high of approximately 76 percent in 1973 to a low of 60 percent in 1981. Estimates of total annual emissions of SO_2, PM, and NOx are proportional to the annual fuel usage. Note that the annual emissions of SO_2 from 1976 to 1982 approximately doubled, compared to the period from 1973 to 1975. This is due to the relaxation of the sulfur-in-fuel SIP limitation in accordance with Massachusetts General Laws of 1974, Chapter 494, and correlates well with ambient trends of SO_2 in Metropolitan Boston. Emissions of PM and NOx from New Boston Station have not changed significantly from 1973 to 1982. At the same time ambient levels of TSP have decreased markedly. Ambient NOx trends during this period are difficult to discern.

Table 5.3-11 provides a more detailed breakdown of monthly fuel usage at New Boston Station for two typical 12-month periods. Estimates of SO_2, PM, and NOx emissions for each month are also shown.

Twenty-one other major stationary sources of TSP, SO_2, and/or NOx are known to be located within 12.4 miles of New Boston Station. These sources and associated emissions, which were provided by DEQE, are listed in Table 5.3-12. Figure 5.3-3 shows the approximate locations of the major stationary sources with respect to New Boston Station. DEQE classifies a major source as one which emits at least 100 tons per year (actual emissions) of a criterion pollutant. CO and ozone are not considered to be major stationary source pollutants, but are more mobile source (cars, trucks, etc) pollutants. No major sources of lead are located within 12.4 miles of New Boston Station.

At the present time there are no major sources of emissions in South Boston except New Boston Station. BECO's L Street Station, shown in Table 5.3-12 and Figure 5.3-3, ceased operation in 1981 and, therefore, is no longer a contributing emission source to the Metropolitan Boston airshed. Due to the time lag involved in updating the current major source emissions, L Street Station is still listed by DEQE as a major source of emissions of SO_2 (1117 tons/year) and NOx (753 tons/year). BECO will continue to periodically operate auxiliary package boilers at L Street Station for startup steam to New Boston Station in the event both Units 1 and 2 are out of service. Emissions will be minor. In addition, Massachusetts Bay Transportation Authority's (MBTA) generating facility located in South Boston ceased operation in August 1981. In its last years of operation, the MBTA facility emitted an average of 400 tons/year of SO_2, and 350 tons/year of NOx. It is estimated that the combined shutdown of both these facilities has reduced the annual emission source contributions of SO_2 and NOx to the Metropolitan Boston airshed by approximately 1500 tons and 1100 tons, respectively. The combined reduction in annual PM emissions is less than 100 tons.

Relative to the total annual emissions contributing to the existing ambient concentrations in Metropolitan Boston, these emissions are a small percent. Since existing air quality concentrations are a result of the combined impacts associated with emissions from mobile sources, the major sources shown in Table 5.3-12, innumerable minor stationary sources, and pollutants transported into the region from emission sources outside the Metropolitan Boston AQCR, the influence of the shutdowns is insignificant to Metropolitan Boston air quality.

5.3.1.3 Future Trends in Air Quality for Criteria Pollutants

Predicting future levels of ambient pollutants is a complex task that few investigators have attempted. It is a two-step process in which estimates of future emissions must first be developed, then converted to ambient air concentrations. This process is complicated by the fact that any air quality region is not isolated from outside influences. Even if regional emission estimates are accurate, air quality cannot be predicted with certainty because air masses may move in and out of a region in an unpredictable fashion. If the area under study is large enough, the predictions may have a higher degree of accuracy because emissions are averaged over an all-inclusive area. On a regional or smaller basis, the allocation of predicted future emissions to that area can only be approximated. For example, the location of economic or residential growth, suggesting an increase in industrial space heating or transportation emissions, can only be approximated.

Even if emission predictions are accurate, the conversion of emissions to ambient air quality concentrations may introduce new uncertainties. Short-term concentrations (24 hours or less) are difficult to predict because they are largely influenced by continually changing meteorological conditions. Prediction of extreme values, such as the "highest-second-highest" concentration in the analysis of short-term concentrations is an even more inexact science. Furthermore, comparing predicted concentrations to those actually monitored may be deceptively inaccurate if monitor locations change over the years.

Particulate TSP concentrations are presently above secondary ambient standards in six cities in Metropolitan Boston. DEQE requested an 18-month extension for filing a SIP revision to reduce the levels of TSP in those cities, but has not yet filed a plan (DEQE 1979a). However, for those cities currently exceeding ambient standards, control measures may be enacted to prevent reentrainment of road dust which is a frequent cause of particulate non-attainment. It is, therefore, expected that standards in non-attainment cities will be attained over the next several years. In all other cities, the future trend may be expected to follow the present pattern of relatively consistent concentration levels (EPA 1982).

The United States Department of Energy (DOE) has forecast particulate emissions, on a regional (New England) scale, showing a 2 percent decline from 1975 to 2000 (DOE 1981). An earlier DOE study predicted particulate emissions to increase slightly (4 to 11 percent) in New England over a 10-year (1975 to 1985) period (DOE 1977). An EPA study showed a similar increase (EPA 1977).

A more recent DOE study attempted to convert emission changes due to 42 potential coal conversions in the Northeast to ambient concentrations. The predicted result indicates an increase in annual TSP concentrations of less than 2 percent in the Boston subregion, composed of Massachusetts, Rhode Island, and parts of Connecticut, New York, Vermont, New Hampshire, and Maine (DOE 1982b).

RPM will likely behave as TSP with no significant change in ambient concentrations during the near future. For those cities which are presently non-attainment for TSP, the improvement in TSP will likely be from reducing coarse particulate levels since they are the probable cause for non-attainment in those locations. Therefore, RPM concentrations will probably not change significantly, even in the non-attainment areas.

Sulfur Dioxide

Ambient concentrations of SO_2 show no significant trend over the last 5 years and this lack of movement will probably continue into the near future (EPA 1982). DOE has predicted the effect of 42 potential coal conversions in the Northeast on SO_2 concentrations. The results show a less than 2 percent increase in annual SO_2 concentrations in Metropolitan Boston and a 6 percent increase in the 24-hour concentration (DOE 1982b). These predicted increases are within the error range of the models employed.

Another study predicted future SO_2 emissions for each state in the continental United States, under the auspices of joint United States and Canadian Memorandum of Intent on Transboundary Air Pollution (U.S. 1982). Results show SO_2 emissions in an initial decline in Massachusetts from 345,000 tons in 1980 to 252,000 tons in 1990, and then a slight rise to 265,000 tons in 2000. The large initial decline in SO_2 may be an artifact of the methods used to collect the data and then assign emissions state-by-state. These projections include all types of sources, e.g., electric utilities, transportation, smelters. DOE has also predicted SO_2 emissions for New England for the year 2000, showing a 10 percent increase over 1975 emissions (DOE 1981). One factor which might lead to declining SO_2 concentrations would be implementation of acid precipitation legislation requiring a reduction in SO_2 emission from all sources.

Nitrogen Dioxide

Emissions of NOx which are emitted about equally by transportation and stationary combustion sources should decrease in the future, thereby resulting in an improvement in ambient NO_2 concentrations. This is due in large part to transportation control measures. For stationary source emissions, DOE predicts a less than 6 percent increase in annual ambient NO_2 concentrations due to an increase in NOx emissions from coal conversions (DOE 1982a). Overall ambient NO_2 concentrations are not expected to change significantly over the next several years. One study projects emissions of NOx in Massachusetts to increase from 253,000 tons in 1980 to 339,000 tons in 1990 and 416,000 tons in 2000 (U.S. 1982). Another recent study predicts a 10 percent decline in NOx emissions for New England during the period from 1975 to 2000 (DOE 1981).

Carbon Monoxide and Ozone

CO and ozone are currently above ambient standards in some locations (see Table 5.3-3). The DEQE has submitted an SIP to attain the standards for CO and ozone by 1987 (DEQE 1979b). The SIP includes, among other measures, an inspection and maintenance program for automobile emissions which began in April 1983. This measure, along with state VOC control regulations for solvent metal degreasing, surface coating operations, petroleum storage, etc, will ensure that CO and ozone are in attainment by 1987.

CO and ozone ambient air quality concentrations may continue to improve after 1987 as the vehicle age mix of cars and trucks improves with a higher portion of vehicles incorporating more stringent emission controls. This improvement may be somewhat offset if total vehicle miles traveled (VMT) increases significantly, though the DEQE will continue to adjust the transportation portion of the CO and ozone SIP to reflect any increases in VMT.

Lead

Emissions of lead which are primarily associated with automobile exhausts will probably have declining ambient concentrations in the future as the percentage of cars using lead-free gasoline increases.

5.3.2 Noncriteria Pollutants

Noncriteria pollutants include sulfates, trace elements, and radionuclides. Because of technical and scientific uncertainties, there are currently no air quality regulations (ambient air quality or emission standards) pertaining to either sulfates, trace elements, or radionuclides as a result of fossil-fuel combustion in Massachusetts. In recent years, however, the environmental significance of these noncriteria pollutants, or their by-products, has been under evaluation. Whether the establishment of standards for these pollutants is forthcoming, or even appropriate, has not been resolved. This is due in part to the uncertainty of the sources of these pollutants, the atmospheric chemistry involved, and the significance of their impacts.

5.3.2.1 Ambient Air Quality Data for Noncriteria Pollutants

The most recent available ambient air quality data for sulfates, trace metals, and radionuclides collected within 12.4 miles of New Boston Station are presented in the following paragraphs. Sulfate data are generally representative of the period from 1977 through 1981. Data collected from 1976 through 1980, rather than 1978 through 1981, were analyzed for trace elements because of the limited availability of these data for 1981. Due to the lack of radionuclide data collected in Metropolitan Boston, regional data were utilized. No ambient monitors for sulfates, trace elements, or radionuclides have been located in South Boston.

Sulfates

Recently, increased emphasis has been place on ambient concentrations of sulfates because it is generally believed that they are the major factor contributing to acid precipitation. However, conclusive evidence demonstrating this is yet to be developed.

Ambient sulfate data in Metropolitan Boston have been collected by BECO at four sites, by EPA at two sites, and Harvard University at one site. A summary of the available sulfate data from all sites is presented in Table 5.3-13. No standards regulating the concentration in ambient air or limiting the source emissions of sulfates presently exist because of the lack of scientific and technical data. It is known, however, that sulfates (usually as sulfuric acid, ammonium bisulfate, or ammonium sulfate) are primarily "secondary" pollutants, because they are formed in the atmosphere from SO_2 rather than emitted directly from combustion sources.

Although no ambient sulfate data have been collected in South Boston, it can be concluded that concentrations are within the range of concentrations monitored in the remainder of Metropolitan Boston, as shown in Table 5.3-13. This is due to the nature of the pollutant as a product of long-range transport, thereby limiting variations over a relatively small area. There are no known sources in South Boston emitting significant amounts of sulfates directly into the atmosphere that would alter this conclusion.

Because of the relatively recent concern with sulfates as a possible contributor to acid precipitation, long-term data necessary to determine the trend in ambient concentrations of sulfates in Metropolitan Boston are not available. However, an analysis of the 5 years of data provided in Table 5.3-13 does not indicate any discernible trend in ambient sulfate concentrations. Regional studies have shown, that, in general, sulfate concentrations in the Northeastern United States during the mid-1970s ranged between 10 and 15 ug/m³, or approximately 15 to 20 percent of TSP concentrations (EPA 1981). Data provided in Tables 5.3-4 and 5.3-13 demonstrate that the sulfate/TSP ratio has remained approximately the same in Metropolitan Boston during the period from 1978 to 1981.

Trace Elements

Table 5.3-14 presents a summary of ambient air quality data for the 12 most commonly analyzed trace elements. The 12 elements listed are all metallic ions in the periodic chart of the elements. The table presents maximum 24-hour and annual average concentrations as determined by EPA laboratories through analysis of TSP samples collected from 1976 through 1980 at two sites: 115 Southampton Street, Boston, and Oxford Street, Cambridge. In addition, a laboratory analysis of TSP samples collected in Watertown by Harvard University during the period from May 1979 to April 1981 was performed for iron, vanadium, and selenium (Spengler 1982). Ambient concentrations for the 2-year period averaged 330 ng/m³, 27 ng/m³, and 0.8 ng/m³ for iron, vanadium, and selenium, respectively. In most cases, the ambient levels of the 12 trace elements are only slightly above the lower detectable limit. No identifiable emission source type (e.g., copper smelter, nickel/cadmium battery manufacturing) exists in South Boston that would cause the ambient concentrations of any of the trace elements to vary significantly from concentrations monitored at the two existing sites in Metropolitan Boston. No ambient air quality or emission standards applicable to fossil-fuel combustion facilities in Massachusetts presently exist for trace elements.

A long-term analysis has been performed by EPA for nine trace elements for the period from 1970 through 1974 (EPA 1981). Regional trends are examined for the following elements: beryllium, cadmium, chromium, cobalt, copper, iron, manganese, nickel, and vanadium. The data depict a drop in concentration in the Northeast United States of cadmium, iron, manganese, nickel, and vanadium, similar to the downward trend in TSP concentrations for the corresponding time frame. Possible causes for the downward trend in concentrations of these elements are the reduction of these impurities in residual oil, and improved waste incineration practices. No trend is discernible in concentrations of copper and chromium. Trends in concentrations of beryllium and cobalt were not determined due to their less-than-detectable concentrations. No discernible trend is apparent in concentrations of the trace elements monitored in Metropolitan Boston from 1976 to 1980.

Radionuclides

Radionuclide concentrations in ambient air are primarily due to three sources: cosmic ray - target atom interaction, airborne soil particles containing primordial radionuclides such as uranium (U) and thorium (Th), and emanation of radon (Rn) gas from the soil with subsequent decay into daughter products. An additional source is fallout from nuclear weapons testing. Radionuclide concentrations are measured in curies per cubic meter (Ci/m^3), or more frequently in pCi/m^3 ($10^{-12}Ci/m^3$).

Rn emanation is the most prominent source of radioactivity in the atmosphere with concentrations orders of magnitude higher than the radioactivity due to other sources (NCRP 1975). Rn is a decay product of U and Th with the U-238 daughter, Rn-222, emitted from soil at a rate 100 times faster than the Th daughter, Rn-220. Atmospheric concentrations of the parent radionuclide (i.e., U and Th) are extremely low, with airborne soil accounting for all of the radioactivity (NCRP 1975). Measurements at Argonne National Laboratory, which are indicative of general United States background concentrations, are 0.3×10^{-4} pCi/m^3 to 1.2×10^{-4} pCi/m^3.

There are no known continuously operating monitoring sites within 12.4 miles of New Boston Station collecting ambient data for radionuclides. However, BECO does operate a radiation monitoring network in the vicinity of Plymouth, which is approximately 36 miles south of New Boston Station. Ambient data for Th-228, collected at Plymouth from 1978 through 1981, are given in Table 5.3-15. Concentrations can also be reported as gross alpha or beta particulate discharges from all radionuclides present. Annual averages of gross alpha and beta concentrations recorded at the Pilgrim monitor are also presented in Table 5.3-15.

Other measurements have been taken periodically for special studies or special events, such as the Chinese atmospheric nuclear weapons detonations in 1977 and 1978. The range of gross beta concentrations at the nearest monitors (Lawrence, MA, and Hartford, CT), shown in Table 5.3-15, are higher than the background levels from the Pilgrim Station, mainly due to fallout of the weapons' produced fission products (ERAMS 1983).

Researchers have also measured Rn-222 and daughter product concentrations in the Boston area for short-term studies. Rn-222 ambient concentrations between 10 and 40 pCi/m^3 were recorded in Boston. In contrast, indoor levels as high as 940 pCi/m^3 were recorded due to trapping in confined spaces. Others measured a

Rn daughter, lead-210, in Massachusetts at a very low concentration of 0.2×10^{-4} pCi/m^3 (NCRP 1975).

Rn levels may be higher for coastal areas when the prevailing winds are from the continent. Onshore prevailing winds have lower concentrations because the soil component in winds off the ocean is less. The average Rn-222 concentration in the Northern Hemisphere, calculated from the world release of Rn from the soil, is 100 pCi/m^3, though concentrations over land would be higher (NCRP 1975). The measurements in Boston indicate that Boston background Rn concentrations may be lower than many other parts of the Northern Hemisphere.

5.3.2.2 Emissions of Noncriteria Pollutants from New Boston Station

Emissions of noncriteria pollutants specifically applicable to New Boston Station are not readily available. In addition, precise concentrations of most of these substances in the specific fuel oils burned at New Boston Station are not available. However, estimates of present emissions of trace elements and radionuclides have been calculated, based on the results of typical fuel oil constituent analyses and/or emission testing performed on similar stationary combustion sources. Table 5.3-16 provides estimated trace element and radionuclide emissions for the period from 1973 to 1982 at New Boston Station. A more detailed discussion of present trace metal and radionuclide emissions is presented in Section 7.1.2.1.

As stated in Section 5.3.2.1, sulfates are primarily considered as secondary pollutants because they are formed in the atmosphere from SO_2. However, it has been estimated that 40 percent of PM emissions may be emitted as particulate sulfate from oil-fired power plants (EPA 1978a).

5.3.2.3 Future Trends in Air Quality for Noncriteria Pollutants

As previously described, sulfates are secondary pollutants, i.e., formed primarily in the atmosphere. Sulfates are regional in nature and concentrations in the northeast can be influenced by air masses from outside the region. Historically, SO_2 emissions have declined in the Northeast but ambient sulfate concentrations have not followed that pattern, instead remaining fairly constant.

Concentrations of sulfates may be expected to remain steady as long as SO_2 emissions remain constant in the Eastern and Midwestern United States. However, sulfur emission reduction legislation pending in the United States Congress, if enacted, could lower SO_2 emissions over a wide area and might result in lower sulfate concentrations in the Northeast. Unfortunately, the scientific basis for SO_2 conversion and transport is not well understood so there is no assurance that sulfate levels would decline in Metropolitan Boston with a concurrent decrease in SO_2 throughout the Eastern and Midwestern United States.

Trace elements generally behave similar to TSP since they are in particulate form. Since TSP concentrations are expected to remain relatively constant, trace element concentrations may well remain constant also. An analysis based strictly on predicted changes in emissions of trace elements from various sources is inconclusive because sources have not been adequately characterized with respect to trace element emissions.

Radionuclides, specifically the daughter products of Rn decay, are also associated with particulates. They are primarily a result of Rn emanation from soil. Because the principal source of radionuclides to the atmosphere is natural radioactivity in the soil, future ambient concentrations are expected to remain consistent with present values.

5.3.3 Reference

Danielsen, E.F., and V.A. Mohnen. Project Duststorm Report: Ozone Transport, In Situ Measurements and Meteorological Analyses of Tropopause Folding. Journal of Geophysic Research 82(37): 5867-5877. 1977.

Department of Environmental Quality Engineering, (DEQE) 1979b, Massachusetts State Implementation Plan for Ozone and Carbon Monoxide, May 1979.

Department of Environmental Quality Engineering, (DEQE) 1979a, Technical Support for a Request for an Eighteen Month Extension to Submit a Revision to the Massachusetts State Implementation Plan to Attain Massachusetts and National Secondary Total Suspended Ambient Air Quality Standards, March 1979.

Department of Environmental Quality Engineering (DEQE). Annual Air Quality Report for 1976 and 1977. November 1978.

Environmental Radiation Ambient Monitoring System (ERAMS). Data Supplied by Regional Radiation Representative, U.S. EPA. Boston, MA. January 1983.

National Council on Radiation Protection and Measurements (NCRP). Natural Background Radiation in the United States. NCRP Report No. 54, Washington, DC. November 1975.

Spengler, J.D., et al. Mass and Elemental Composition of Fine and Coarse Particulates in Six U.S. Cities. Presented at 75th Annual Meeting of the Air Pollution Control Association. New Orleans, LA. June 1982.

United States (U.S.),. Emissions, Costs and Engineering Assessment, Work Group 3B. United States-Canada Memorandum of Intent on Transboundary Air Pollution, Final Report. June 1982.

U.S. Department of Energy (DOE), 1985 Air Pollution Emissions. DOE/PE-0001, UC-11, December 1977.

U.S. Department of Energy (DOE), Environmental Trends to the Year 2000. DOE/EP-0021, July 1981.

U.S. Department of Energy (DOE). 1982b, Final Northeast Regional Environmental Impact Statement: The Potential Conversion of Forty-Two Power Plants from Oil to Coal or Alternate Fuels, DOE/EIS-0083-F, October 1982.

U.S. Department of Energy (DOE), 1982a, The Northeast Regional Environmental Impact Study: Air Quality Technical Report ANL/ES-122, March 1982.

U.S. Environmental Protection Agency (EPA). Air Management Division: 1982 Annual Report, Region I, 1982.

U.S. Environmental Protection Agency (EPA). Air Quality Criteria for Oxides of Nitrogen. June 1979.

U.S. Environmental Protection Agency (EPA). Air Quality Criteria for Particulate Matter and Sulfur Dioxide, February 1981.

U.S. Environmental Protection Agency, (EPA), (with the Executive Office of the President), Air Pollution Impacts of the Oil and Gas Replacement Program in the Industrial Sector. June 1977.

U.S. Environmental Protection Agency (EPA). Impact of Energy Shortage on Ambient Sulfur Dioxide and Particulate Levels in Metropolitan Boston AQCR. EPA-450/3-75-068. July 1975.

U.S. Environmental Protection Agency (EPA). 1976-1982. Regional Administrator's Annual Report, Region I. Environmental Quality in New England, 1976, 1977, 1978, 1979, 1980, 1981, 1982.

U.S. Environmental Protection Agency (EPA), 1980, Transportation and the Environment, EPA Journal Reprint, Volume 6, No. 2, February 1980.

U.S. Environmental Protection Agency (EPA). 1978 . Workshop Proceedings on Primary Sulfate Emissions from Combustion Sources, Vol. 1 Battelle-Columbus Laboratories, Sulfur Oxide Measurements of Utility Power Plant Emissions. August 1978.

Wiltsee, K.W. et al. Analysis of Total Suspended Particulate Concentrations in Metropolitan Boston. Walden Division of Abcor, Inc. June 1977.

TABLE 5.3-1

MASSACHUSETTS AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Criteria Pollutant	Averaging Interval(1)	Primary Standard		Secondary Standard	
		(ug/m^3)	(ppm)	(ug/m^3)	(ppm)
Sulfur Dioxide (SO_2)	Annual	80	0.03	-	-
	24-hr	365	0.14	-	-
	3-hr	-	-	1,300	0.5
Total Suspended Particulate (TSP)	Annual	75(2)	-	60(2),(3)	-
	24-hr	260	-	150	-
Nitrogen Dioxide (NO_2)	Annual	100	0.05	100	0.05
	1-hr(4)	320	0.16	-	-
Carbon Monoxide (CO)	8-hr	10(5)	9	10(5)	9
	1-hr	40(5)	35	40(5)	35
Ozone (O_3)	1-hr(6)	240	0.12	240	0.12
Lead (Pb)	3-month(7)	1.5	-	1.5	-

NOTES:

1. 1-hr, 3-hr, 8-hr, and 24-hr standards not to be exceeded more than once per year. Arithmetic mean for 3-month and annual standards except particulate matter.
2. Annual geometric mean.
3. For use as a guide in assessing implementation plans to achieve the 24-hr standard.
4. Massachusetts Department of Environmental Quality Engineering guideline, applicable only to major sources of oxides of nitrogen.
5. Carbon monoxide standards are shown in units of mg/m^3.
6. Standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above standard, is equal to or less than one.
7. Maximum arithmetic mean average over a calendar quarter.

TABLE 5.3-2

AMBIENT AIR QUALITY MONITORING STATIONS

	Monitoring Site (SAROAD No.)	Operated By	Pollutant(s) Monitored	UTM Coordinates X	UTM Coordinates Y
1.	590 Commonwealth Ave (Kenmore Sq) Boston (0240-002)	DEQE	TSP, SO_2, NO_2, CO	327.1	4690.4
2.	115 Southampton St Boston (0240-012)	DEQE EPA	TSP, Pb, SO_4, NO_3, Trace Metals	329.6	4688.2
3.	68 Central Sq East Boston (0240-013)	DEQE	TSP	331.9	4693.2
4.	Kneeland St Boston (0240-015)	DEQE	SO_2	330.0	4690.0
5.	Visconti St (Callahan Tunnel) Boston (0240-016)	DEQE	TSP, SO_2, NO_2 CO, O_3	332.0	4692.5
6.	Atlantic Ave Boston (0240-018)	BECO	TSP, SO_2, SO_4	330.8	4690.8
7.	Long Island Boston (0240-019)	BECO	TSP, SO_2, SO_4	337.6	4686.6
8.	Dewar St Dorchester (0240-020)	BECO	TSP, SO_2, SO_4	330.5	4685.9
9.	Bremen St East Boston (0240-021)	DEQE BECO	TSP, SO_2, NO_2, CO, O_3 TSP, SO_2, SO_4	332.7	4693.4
10.	600 Washington St Boston (0240-022)	DEQE	CO	330.1	4690.8

TABLE 5.3-2 (Cont)

	Monitoring Site (SAROAD No.)	Operated By	Pollutant(s) Monitored	UTM Coordinates X	UTM Coordinates Y
11.	Morrissey Blvd Boston (0240-023)	DEQE	SO_2	331.5	4687.0
12.	200 Columbus Ave Boston (0240-024)	DEQE	TSP	329.4	4690.4
13.	59 The Fenway Boston (0240-025)	DEQE	TSP	327.7	4689.9
14.	115 Greenough St Brookline (0340-001)	DEQE	TSP	324.5	4689.0
15.	Oxford St Cambridge (0360-001)	DEQE EPA	TSP,Pb NO_2,SO_4, Trace Metals	325.8	4694.3
16.	Science Park Cambridge (0360-004)	DEQE	TSP,SO_2,CO	329.8	4692.6
17.	Chestnut and 6th St Chelsea (0380-002)	DEQE	TSP	332.5	4695.1
18.	Main St Lynn (1100-001)	DEQE	TSP	339.6	4703.2
19.	436 Lynnway Lynn (1100-003)	GE	TSP,SO_2	339.2	4701.5
20.	100-120 Main St Medford (1220-002)	DEQE	TSP	326.3	4698.0
21.	Wellington Circle Medford (1220-003)	DEQE	TSP,SO_2,CO O_3	328.6	4696.6

TABLE 5.3-2 (Cont)

	Monitoring Site (SAROAD No.)	Operated By	Pollutant(s) Monitored	UTM Coordinates X	UTM Coordinates Y
22.	148 Chestnut St Needham (1480-003)	DEQE	TSP	315.5	4682.8
23.	Fore River Bridge Quincy (1880-002)	DEQE	TSP, SO_2, CO, O_3	337.3	4678.6
24.	Doan ST Quincy (1880-006)	DEQE	TSP	338.1	4679.9
25.	Hancock St Quincy (1880-007)	DEQE	TSP	332.4	4682.1
26.	Powder House Blvd (Tufts University) Somerville (2100-003)	DEQE	SO_2, NO_2, CO, O_3	326.5	4696.5
27.	Hill St Stoneham (2180-001)	AQC	SO_2	326.5	4704.4
28.	Main and Moody St Waltham (2340-004)	DEQE	TSP, SO_2, CO	315.9	4693.5
29.	Victory Field Watertown (2380-005)	DEQE HU	SO_2, NO_2, CO, O_3 TSP, SO_4, Trace Metals RPM	320.3	4693.5
30.	Woburn and Montvale Ave Woburn (2620-002)	DEQE	TSP	323.0	4705.0

NOTES:

DEQE = Massachusetts Department of Environmental Quality Engineering

EPA = Environmental Protection Agency, Federally analyzed data from the same site

BECO = Boston Edison Company

TABLE 5.3-2 (Cont)

Monitoring Site (SAROAD No.)	Operated By	Pollutant(s) Monitored	UTM Coordinates	
			X	Y

GE = General Electric

AQC = Air Quality Consultant

HU = Harvard University

TABLE 5.3-3

ATTAINMENT STATUS DESIGNATIONS OF AQCR 119 WITHIN 12.4 MILES OF NEW BOSTON STATION

Criteria Pollutant	Area	Status
TSP	Cambridge	Does not meet secondary standards
	Lynn	Does not meet secondary standards
	Medford	Does not meet secondary standards
	Quincy	Does not meet secondary standards
	Revere	Does not meet secondary standards
	Waltham	Does not meet secondary standards
	Other Areas	Cannot be classified or better than national standards
SO_2	Entire State	Better than national standards
NO_2	Entire State	Cannot be classified or better than national standards
CO	Boston	Does not meet primary standards
	Cambridge	Does not meet primary standards
	Medford	Does not meet primary standards
	Quincy	Does not meet primary standards
	Waltham	Does not meet primary standards
	Other Areas	Cannot be classified or better than national standards
O_3	Entire State	Does not meet primary standards
Pb	Entire State	Currently no designations

TABLE 5.3-4

AMBIENT AIR QUALITY DATA SUMMARY FOR TOTAL SUSPENDED PARTICULATE

Monitoring Site	Location(1)		Year	24-Hr Average Concentration		Annual Geometric Mean (ug/m^3)
	Direction (deg)	Distance (miles)		Highest (ug/m^3)	2nd Highest(2) (ug/m^3)	
590 Commonwealth Ave (Kenmore Sq) Boston	280	3.3	1978	247	176	82
115 Southampton St Boston	250	1.8	1978	129	119	67
			1979	192	117	67
			1980	149	133	74
			1981	111	98	55
68 Central Sq East Boston	350	2.5	1981	102	95	53
Visconti St (Callahan Tunnel) Boston	350	2.0	1978	68	64	55
Atlantic Ave Boston	320	1.4	1978	110	98	61
			1979	127	112	56
			1980	123	122	64
			1981	139	136	72
Long Island Boston	120	3.7	1978	66	62	29
			1979	81	74	27
			1980	68	62	28
			1981	55	53	26
Dewar St Dorchester	210	2.4	1978	112	78	43
			1979	105	88	37
			1980	115	101	43
			1981	88	71	37
Bremen St Boston	10	2.7	1978	85	83	40
			1979	115	103	46
			1980	97	91	48
			1981	109	88	44
200 Columbus Ave Boston	290	1.9	1981	123	97	62
59 The Fenway Boston	280	2.9	1980	96	64	(3)

TABLE 5.3-4 (Cont)

Monitoring Site	Location[1]		Year	24-Hr Average Concentration		Annual Geometric Mean (ug/m^3)
	Direction (deg)	Distance (miles)		Highest (ug/m^3)	2nd Highest[2] (ug/m^3)	
115 Greenough St Brookline	270	4.8	1978	100	86	38
			1979	155	108	43
			1980	85	79	46
Oxford St Cambridge	310	5.2	1978	126	99	49
			1979	118	104	50
			1980	86	85	49
Science Pk Cambridge	320	2.6	1978	237	121	72
Chestnut & 6th St Chelsea	0	3.7	1978	160	131	64
			1979	183	174	63
			1980	124	120	61
			1981	149	128	57
Main St Lynn	30	9.8	1978	112	109	47
			1979	138	113	51
436 Lynnway Lynn	30	8.8	1978	117	75	39
			1979	142	130	56(4)
			1980	82	78	43
			1981	119	114	51
100–120 Main St Medford	330	6.6	1978	167	117	55
			1979	122	119	55
			1980	124	104	58
			1981	102	66	[3]
Wellington Circle Medford	330	5.2	1978	153	135	65
148 Chestnut St Needham	250	11.2	1978	109	92	43
			1979	186	85	37
			1980	95	82	44
			1981	76	72	31
Fore River Bridge Quincy	150	7.3	1978	145	130	67
Doan St Quincy	150	6.8	1978	48	47	39

TABLE 5.3-4 (Cont)

Monitoring Site	Location (1)		Year	24-Hr Average Concentration		Annual Geometric Mean (ug/m^3)
	Direction (deg)	Distance (miles)		Highest (ug/m^3)	2nd Highest (2) (ug/m^3)	
Hancock St Quincy	180	4.4	1978	100	96	46
			1979	132	107	45
			1980	155	141	54
			1981	84	73	41
Main & Moody St Waltham	280	10.6	1978	217	184	(3)
Victory Field (5) Watertown	290	7.9	1979 1980 1981	-	-	50
Montvale Ave Woburn	330	11.4	1978	121	95	44
			1979	123	108	46
			1980	133	103	52
			1981	85	77	43

NOTES:

1. Monitor location depicts the distance and direction from New Boston Station.
2. Standard compliance is determined by comparing the 2nd highest recorded value to 260 ug/m^3 and 150 ug/m^3. Annual standard is 75 ug/m^3.
3. Total observations during the year are insufficient to determine a reliable annual geometric mean.
4. Number reported is the annual arithmetic mean.
5. Ambient concentration reported is the average TSP level over the period May 1979 through April 1981, as monitored by Harvard University.

TABLE 5.3-5

AMBIENT AIR QUALITY DATA SUMMARY FOR SULFUR DIOXIDE

	Location[1]			3-Hr Running Average		24-Hr Daily Average		Annual
Monitoring Site	Direction (deg)	Distance (miles)	Year	Highest (ug/m^3)	2nd Highest[2] (ug/m^3)	Highest (ug/m^3)	2nd Highest[2] (ug/m^3)	Arithmetic[5] Mean (ug/m^3)
590 Commonwealth Ave (Kenmore Sq) Boston	280	3.3	1978	469	424	165	154	50
			1979	312	288	170	152	50
			1980	367	320	197	191	55
			1981	343	317	180	170	50
Kneeland St Boston	290	1.5	1981	296	257	189	173	42
Visconti St (Callahan Tunnel) Boston	350	2.0	1978	204	199	115	94	37
			1979	283	209	130	115	26
			1980	131	106	60	55	21[4]
Atlantic Ave Boston	320	1.4	1978[3]	254	225	131	126	40
			1979	285	267	168	149	43
			1980	270	249	186	157	43
			1981	359	280	191	147	41
Long Island Boston	120	3.7	1978[3]	173	170	120	113	22
			1979	243	228	120	118	26
			1980	241	202	131	128	26
			1981	233	196	113	104	23
Dewar St Dorchester	210	2.4	1978[3]	267	217	131	113	35
			1979	390	335	173	162	35
			1980	282	267	149	147	32
			1981	406	275	204	170	29
340 Bremen St Boston	10	2.7	1978[3]	209	207	165	132	24
			1979	382	356	160	147	49
			1980	225	191	131	123	34[4]
			1981	215	204	126	102	37
Morrissey Blvd Boston	200	1.4	1981	288	273	178	160	29
Science Park Cambridge	320	2.5	1978	259	249	147	147	42
436 Lynnway Lynn	30	8.8	1978	120	84	63	58	34
			1979	55	50	39	39	26
			1980	181	162	63	50	29
			1981	414	369	152	144	26

TABLE 5.3-5 (Cont)

	Location[1]			3-Hr Running Average		24-Hr Daily Average		Annual
Monitoring Site	Direction (deg)	Distance (miles)	Year	Highest (ug/m^3)	2nd Highest[2] (ug/m^3)	Highest (ug/m^3)	2nd Highest[2] (ug/m^3)	Arithmetic[5] Mean (ug/m^3)
Wellington Circle Medford	330	5.2	1978	259	243	139	139	34
			1979	288	259	150	141	31
			1980	254	238	149	118	37[4]
Fore River Bridge Quincy	150	7.3	1978	230	225	136	126	31
			1979	278	238	180	152	31
			1980	225	223	126	123	34
Powder House Blvd Tufts University Somerville	320	5.8	1980	233	202	157	118	39[4]
			1981	262	257	173	136	31
Hill St Stoneham	340	10.1	1980	215	212	136	134	21
			1981	283	230	141	105	18
Main & Moody St Waltham	280	10.6	1978	188	186	118	110	26
Victory Field Watertown	290	7.9	1979	196	160	105	102	37
			1980	278	249	149	141	33
			1981	249	227	155	107	29

NOTES:

1. Monitor location depicts the distance and direction from New Boston Station.

2. Standard compliance is determined by comparing the second highest recorded value to the 3-hour standard of 1300 ug/m^3 and the 24-hour standard of 365 ug/m^3.

3. Monitoring data inclusive of the period June 1978 through December 1978.

4 Calculated from less than 4000 total observations. The annual arithmetic average may not be representative.

5. Annual standard is 80 ug/m^3

TABLE 5.3-6

AMBIENT AIR QUALITY DATA SUMMARY FOR NITROGEN DIOXIDE

Monitoring Site	Location (1) Direction (deg)	Location (1) Distance (miles)	Year	1-Hr Average Conc. Highest (ug/m^3)	1-Hr Average Conc. 2nd Highest (ug/m^3)	Annual Arithmetic Mean (ug/m^3) (2)
590 Commonwealth Ave (Kenmore Sq) Boston, MA	280	3.3	1978	506	430	86
			1979	401	401	79
			1980	338	338	93
			1981	376	367	71
Visconti St (Callahan Tunnel) East Boston	350	2.0	1978	481	464	86
			1979	401	382	90
			1980	395	385	(3)
Bremen St East Boston, MA	10	2.7	1980	197	188	(3)
			1981	214	207	55
Powder House Blvd (Tufts University) Somerville	320	5.8	1980	132	132	(3)
			1981	201	197	47
Victory Field Watertown	290	7.9	1980	417	182	(3)

NOTES:

1. Monitor location depicts the distance and direction from New Boston Station.
2. Annual standard is 100 ug/m^3.
3. Total observations during the year are insufficient to determine a reliable annual arithmetic mean.

TABLE 5.3-7

AMBIENT AIR QUALITY DATA SUMMARY FOR CARBON MONOXIDE

	Location (1)			1-hr Average		8-hr Average	
Monitoring Site	Direction (deg)	Distance (miles)	Year	Highest (mg/m^3)	2nd Highest (2) (mg/m^3)	Highest (mg/m^3)	2nd Highest (2) (mg/m^3)
590 Commonwealth Ave (Kenmore Sq) Boston	280	3.3	1978	22.9	21.7	13.7	13.7
			1979	22.9	19.5	17.2	16.5
			1980	16.1	13.8	11.8	11.2
			1981	22.0	16.0	14.0	10.0
Visconti St (Callahan Tunnel) East Boston	350	2.0	1978	26.3	26.3	17.2	17.2
			1979	28.6	28.6	17.7	17.5
			1980 (3)	18.4	16.1	11.9	11.9
340 Bremen St East Boston	10	2.7	1980 (3)	9.2	8.1	5.4	5
			1981	12	12	10	8
600 Washington St Boston	310	1.7	1980 (3)	28.8	21.9	13.9	11.4
			1981	22	22	14	12
Science Park Cambridge	320	2.6	1978	18.3	14.9	11.4	11.4
Wellington Circle Medford	330	5.2	1978	21.7	21.7	14.9	14.9
			1979	28.6	22.9	23.0	20.4
			1980 (3)	19.6	18.4	12.2	12.2
Fore River Bridge Quincy	150	7.3	1978	16.0	16.0	10.3	10.3
			1979	13.7	11.4	9.7	8.6
			1980	11.5	11.5	8.1	5.3
Powder House Blvd. (Tufts University) Somerville	320	5.8	1980 (3)	6.9	5.8	4.4	2.3
			1981	17	15	10	8
Moody and Main St Waltham	280	10.6	1978	18.3	18.3	10.3	10.3
Victory Field Watertown	290	7.9	1979	12.6	12.6	10.3	8.4
			1980	10.4	10.4	8.2	6.8

NOTES:

1. Monitor location depicts the distance and direction from New Boston Station.
2. Standard compliance is determined by comparing the second highest recorded value to the 1-hour standard of 40 mg/m^3 and the 8-hour standard of 10 mg/m^3.
3. Total observations during 1980 are less than 4000. The data provided may not be representative.

TABLE 5.3-8

AMBIENT AIR QUALITY
DATA SUMMARY FOR OZONE

Monitoring Site	Location (1)		Year	1-Hr Average	
	Direction (deg)	Distance miles		Highest (ppm)	2nd Highest (2) (ppm)
Visconti St East Boston	350	2.0	1980	0.070	0.068
340 Bremen St East Boston	10	2.7	1980	0.120	0.110
			1981	0.115	0.095
Wellington Circle Medford	330	5.2	1978	0.145	0.145
			1979	0.145	0.140
			1980	0.079	0.073
Fore River Bridge Quincy	150	7.3	1978	0.150	0.135
			1979	0.160	0.155
			1980	0.129	0.121
Power House Blvd (Tufts University) Somerville	320	5.8	1980	0.140	0.132
Victory Field Watertown	290	7.9	1980	0.145	0.134

NOTE:

1. Monitor location depicts the distance and direction from New Boston Station.
2. Standard compliance is determined by comparing the second highest recorded value to the 1-hour standard of 0.12 ppm.

TABLE 5.3-9

AMBIENT AIR QUALITY DATA SUMMARY FOR LEAD

	Location[1]				Quarterly Arithmetic
Monitoring Site	Direction (deg)	Distance (miles)	Year	Quarter	Mean (ug/m^3)[3]
115 Southampton St[2] Boston	250	1.8	1976	Second	0.7310
				Fourth	0.7930
			1977	Fourth	0.7311
			1978	First	0.7616
				Second	0.9471
				Third	0.8525
				Fourth	1.2621
			1979	First	1.0131
				Second	0.3943
				Third	0.5529
				Fourth	0.8255
			1980	First	0.8860
Oxford Street[2] Cambridge	310	5.2	1976	Second	0.6630
				Third	0.7480
				Fourth	0.6290
			1977	Fourth	0.8278
			1978	First	0.2618
				Second	0.3948
				Third	0.6363
				Fourth	0.9216
			1979	First	0.6503
				Second	0.3588
				Third	0.3085
				Fourth	0.5920
			1980	First	0.4286

NOTES:

1. Monitor location depicts distance and direction from New Boston Station.
2. Federally compiled data, EPA/atmospheric surveillance.
3. Standard compliance is determined by comparing the recorded quarterly arithmetic mean to 1.5 ug/m(^{3}).

TABLE 5.3-10

ANNUAL FUEL USAGE AND ESTIMATED ANNUAL EMISSIONS OF SO_2, PM, AND NOx FROM NEW BOSTON STATION FOR THE PERIOD 1973-1982

Year	Annual Fuel Oil Usage (Bbl)	Estimated Annual Emissions (Tons) SO_2(1)	PM	NOx
1973	6,927,200	11,201	722	9,129
1974	6,157,900	9,957	642	8,115
1975	6,178,808	9,991	644	8,143
1976	5,421,092	17,532	565	7,144
1977	5,908,840	19,109	616	7,787
1978	6,847,187	22,144	713	9,024
1979	5,860,396	18,953	611	7,723
1980	6,737,559	21,789	702	8,879
1981	5,407,632	17,488	563	7,127
1982	6,249,233	20,210	651	8,236

NOTE:

1. Annual SO_2 emission estimate based on 0.5 percent sulfur-in-fuel oil during the period 1973 to 1975, and 1.0 percent sulfur-in-fuel oil for the period 1976 to 1982.

TABLE 5.3-11

TYPICAL MONTHLY FUEL USAGE AND ESTIMATED EMISSIONS OF SO_2, PM, AND NOx

	Jan 1980 through Dec 1980				Nov 1981 through Oct 1982			
	Fuel Usage (Bbl)	Estimated Emissions(Tons)			Fuel Usage (Bbl)	Estimated Emissions(Tons)		
Month		SO_2	PM	NOx		SO_2	PM	NOx
January	614,367	1,961	64	810	635,555	2,029	66	838
February	628,358	2,006	66	828	531,319	1,696	55	701
March	577,850	1,845	60	762	605,452	1,933	63	798
April	523,058	1,670	55	690	388,755	1,241	41	513
May	582,847	1,860	61	768	564,313	1,801	59	744
June	577,827	1,844	60	762	553,796	1,768	58	730
July	584,934	1,867	61	771	570,843	1,822	60	753
August	574,264	1,833	60	757	547,072	1,746	57	721
September	510,695	1,630	53	673	361,967	1,155	38	477
October	652,029	2,081	68	860	345,887	1,104	36	456
November	518,947	1,657	54	684	630,967	2,014	66	832
December	392,383	1,253	41	517	596,390	1,904	62	786
Totals	6,737,559	21,507	703	8,882	6,332,316	20,213	661	8,349

TABLE 5.3-12

MAJOR SOURCES OF PARTICULATES, SO_2, AND NOx WITHIN 12.4 MILES OF NEW BOSTON STATION (1)

No. (3)	Source Name And Location	UTM Coordinates		Total Emissions (Tons/yr) (2)		
		X	Y	Particulates	SO_2	NOx(As NO_2)
1	Armstrong Cork Braintree	334.4	4673.5	261		
2	Braintree Electric Braintree	337.4	4676.3			120
3	Boston Edison (Kneeland St) Boston	330.4	4690.4			2,463
4	Boston Edison (L Street) Boston	332.3	4689.1		1,117	753
5	Diamond International Boston	324.6	4680.5		279	214
6	The Gillette Co Boston	330.6	4689.8			324
7	Cambridge Electric (Blackstone Plant) Cambridge	325.6	4692.1		188	376
8	Cambridge Electric (Kendall Square) Cambridge	328.2	4690.5			1,104
9	Amstar Corp Charlestown	329.9	4694.9			110
10	Revere Sugar Charlestown	329.8	4694.3			804
11	U.S. Gypsum Charlestown	329.9	4694.9	475		
12	Boston Edison (4) (Mystic Station) Everett	329.7	4695.1	836	25,702	6,764
13	Exxon Corp Everett	330.2	4695.5		137	116

TABLE 5.3-12 (Cont)

No.	Source Name And Location	UTM Coordinates X	UTM Coordinates Y	Total Emissions (Tons/yr)[2] Particulates	Total Emissions (Tons/yr)[2] SO_2	Total Emissions (Tons/yr)[2] NOx(As NO_2)
14	Monsanto Everett	329.4	4697.7		488	
15	General Electric Lynn	337.8	4701.4		1,158	702
16	General Dynamics Quincy	336.7	4677.7			396
17	Proctor & Gamble Quincy	337.7	4678.9	228	292	48
18	New England Power Co.[5] (Salem Harbor Station) Salem	345.9	4709.7	441	43,712	7,612
19	Refuse Energy Saugus	337.0	4701.4		552	660
20	Polaroid Waltham	313.8	4695.6		175	134
21	Atlantic Gelatine Woburn	325.9	4704.8			122

NOTES:

1. Only emissions of particulates, SO_2, and NOx greater than 100 tons/year are listed.
2. Except as noted, emissions data were provided by DEQE in a listing generated on February 1, 1983.
3. Reference number for source location on Figure 5.3-3.
4. Emissions data for Mystic Station provided by BECO.
5. The Salem Harbor Station is located greater than 12.4 miles from New Boston (i.e., 15.3 miles). However, due to the large quantity of emissions relative to other major sources, the Salem Harbor Station is included.

TABLE 5.3-13

AMBIENT AIR QUALITY DATA SUMMARY FOR SULFATES

Monitoring Site	Location(1) Direction (deg)	Location(1) Distance (miles)	Year	24-Hr Avg Highest (ug/m^3)	24-Hr Avg 2nd Highest (ug/m^3)	Annual Arithmetic Mean (ug/m^3)
115 Southampton St Boston	250	1.8	1977	10.5	7.4	6.6
			1978	23.3	16.6	9.9
			1979	26.6	18.3	11.4
			1980	13.6	11.3	(2)
Atlantic Ave Boston	320	1.4	1978	22.4	20.3	9.1
			1979	26.0	21.0	10.0
			1980	17.0	13.0	9.8
			1981	22.0	19.0	11.0
Long Island Boston	120	3.7	1978	18.8	15.6	7.8
			1979	24.0	21.0	9.6
			1980	14.0	13.0	8.6
			1981	15.0	14.0	9.4
Dewar St Dorchester	210	2.4	1978	16.3	16.2	8.4
			1979	27.0	24.0	9.6
			1980	14.0	14.0	9.2
			1981	21.0	16.0	9.8
340 Bremen St East Boston	10	2.7	1978	22.4	19.0	9.3
			1979	24.0	19.0	10.4
			1980	15.0	14.0	9.8
			1981	22.0	16.0	11.0
Oxford St Cambridge	310	5.2	1977	16.8	11.7	9.4
			1978	14.0	13.0	8.2
			1979	17.6	16.6	10.2
			1980	11.5	10.9	(2)
Victory Field[3] Watertown	290	7.9	1979 1980 1981	-	-	8.0

NOTES:

1. Monitor location depicts distance and direction from New Boston Station.

2. Insufficient data to calculate annual average.

3. Ambient concentration reported is the average sulfate level over the period May 1979 through April 1981, as monitored by Harvard University.

TABLE 5.3-14

AMBIENT AIR QUALITY DATA SUMMARY FOR TRACE ELEMENTS

		24-Hour Maximum and Annual Average Concentrations (ng/m^3)			
		115 Southampton St(1) Boston		Oxford St(1) Cambridge	
Name of Element	Year	24-Hour	Annual	24-Hour	Annual
Arsenic (As)	1977	7.9	(2)	6.6	(2)
	1978	-	-	-	-
	1979	-	-	-	-
	1980	-	-	-	-
Beryllium (Be)	1977	0.30	0.30	0.30	(2)
	1978	0.17	0.07	0.07	(2)
	1979	0.17	(2)	0.37	0.17
	1980	0.14	(2)	0.14	(2)
Barium (Ba)	1977	28	18	22	16
	1978	30	14	14	5
	1979	490	(2)	490	(2)
	1980	260	(2)	260	(2)
Cadmium (Cd)	1977	2.3	1.4	2.8	1.7
	1978	10.0	2.0	3.4	1.2
	1979	5.7	1.9	11.0	1.8
	1980	1.7	(2)	1.6	(2)
Chromium (Cr)	1976	-	-	-	4.7
	1977	19	15	15	11
	1978	-	-	-	-
	1979	-	-	-	-
	1980	-	-	-	-
Cobalt (Co)	1977	1.4	0.8	2.0	0.9
	1978	-	-	-	-
	1980	-	-	-	-
	1981	-	-	-	-
Copper (Cu)	1976	-	56	-	219
	1977	240	100	96	62
	1978	140	70	150	45
	1979	82	45	58	30
	1980	56	(2)	52	(2)

TABLE 5.3-14 (Cont)

Name of Element	Year	115 Southampton St(1) Boston		Oxford St(1) Cambridge	
		24-Hour	Annual	24-Hour	Annual
Iron (Fe)	1976	-	613	-	460
	1977	1500	690	950	550
	1978	2000	1100	1500	640
	1979	2300	910	1200	480
	1980	1400	(2)	940	(2)
Manganese (Mn)	1976	-	13	-	11
	1977	33	16	19	15
	1978	50	28	40	17
	1979	81	21	27	13
	1980	26	(2)	18	(2)
Nickel (Ni)	1976	-	18	-	17
	1977	18	10	21	16
	1978	55	19	30	11
	1979	18	9.8	26	9.2
	1980	48	(2)	33	(2)
Vanadium (V)	1976	-	43	-	34
	1977	58	34	77	49
	1978	270	79	120	48
	1979	160	48	140	40
	1980	130	(2)	87	(2)
Zinc (Zn)	1977	310	120	950	240
	1978	2000	220	1500	140
	1979	510	330	650	330
	1980	180	(2)	(2)	(2)

NOTES:

1. Monitoring stations location from New Boston Station: 115 Southampton St, Boston, 250 deg, 1.8 miles; Oxford St, Cambridge, 310 deg, 5.2 miles.

2. Insufficient data to determine annual average.

TABLE 5.3-15

AMBIENT AIR QUALITY DATA SUMMARY
FOR
PARTICULATE GROSS ALPHA AND GROSS BETA RADIOACTIVITY AND THORIUM-228

Monitoring Site	Location (1)		Year	Gross Alpha Annual Arithmetic Mean (pCi/m^3)	Gross Beta Annual Arithmetic Mean (pCi/m^3)	Thorium-228 Annual Arithmetic Mean (pCi/m^3)
	Direction (deg)	Distance (miles)				
Plymouth (Plymouth Nuclear Power Station)	140	36.0	1978	0.007	0.099	0.004
			1979	-	0.043	0.001
			1980	-	0.032	0.0004
			1981	-	0.14	0.0007
Lawrence, Mass	340	25.5	1977	-	0.01-1.08 (2)	
			1978	-	0.06-1.25 (3)	
Hartford, Conn	240	93.2	1978	-	0.02-0.08 (4)	

NOTES:

1. Monitor location depicts distance and direction from New Boston Station.
2. Range during 9/21/77 through 10/14/77.
3. Range during 3/17/78 through 4/7/78.
4. Range during 12/18/78 through 12/29/78.

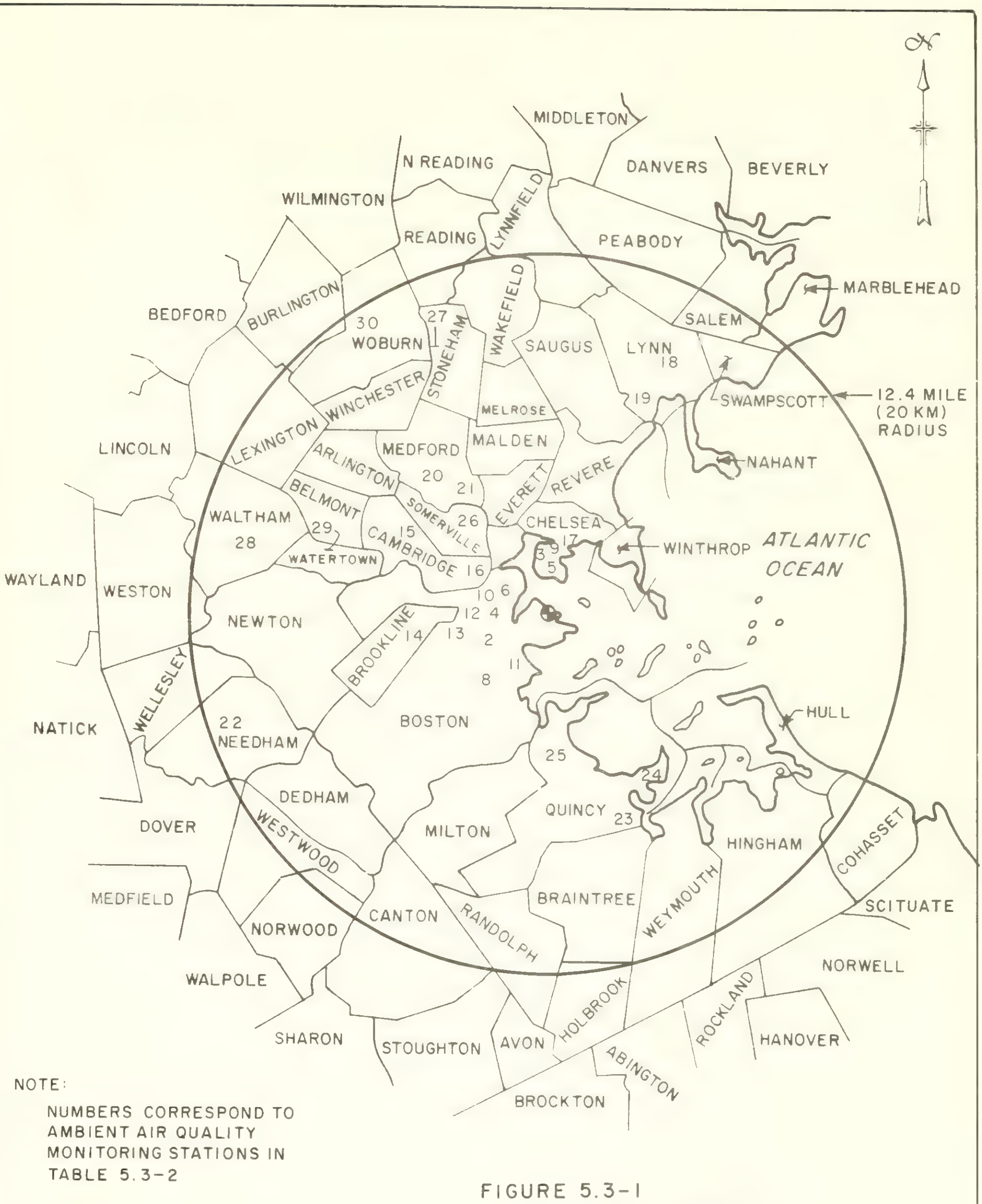
TABLE 5.3-16

ESTIMATED ANNUAL EMISSIONS OF TRACE METALS AND RADIONUCLIDES FOR THE PERIOD 1973-1982(1)

	Trace Elements (Tons)										Radionuclides (uCi)		
Year	As	Be	Cd	Cu	Fe	Hg	Mn	Ni	Se	V	Zn	RA-226	RA-228	Th-228
1973	2.33	0.11	3.54	156.82	11.20	0.04	0.54	14.13	0.50	26.88	1.46	137.55	320.95	445.40
1974	2.07	0.10	3.14	139.40	9.96	0.04	0.48	12.56	0.44	23.90	1.29	122.31	285.39	396.05
1975	2.08	0.10	3.15	139.88	9.99	0.04	0.48	12.60	0.44	23.98	1.30	122.69	286.28	397.28
1976	1.82	0.09	2.77	122.72	8.77	0.03	0.42	11.06	0.39	21.04	1.14	107.64	251.16	348.55
1977	1.99	0.10	3.02	133.76	9.55	0.04	0.46	12.05	0.42	22.93	1.24	117.35	273.83	380.01
1978	2.30	0.11	3.50	155.01	11.07	0.04	0.54	13.97	0.49	26.57	1.44	135.83	316.95	439.85
1979	1.97	0.10	2.99	132.67	9.48	0.04	0.46	11.95	0.42	22.14	1.23	116.40	271.61	376.93
1980	2.27	0.11	3.44	152.52	10.89	0.04	0.53	13.74	0.48	26.15	1.42	133.74	312.06	433.06
1981	1.82	0.09	2.76	122.42	8.74	0.03	0.42	11.03	0.39	20.99	1.14	107.26	250.27	347.31
1982	2.10	0.10	3.19	141.47	10.11	0.04	0.49	12.75	0.45	24.25	1.31	124.02	289.39	401.60

NOTE:

1. Annual emission estimates based on yearly fuel usage shown on Table 5.3-10.

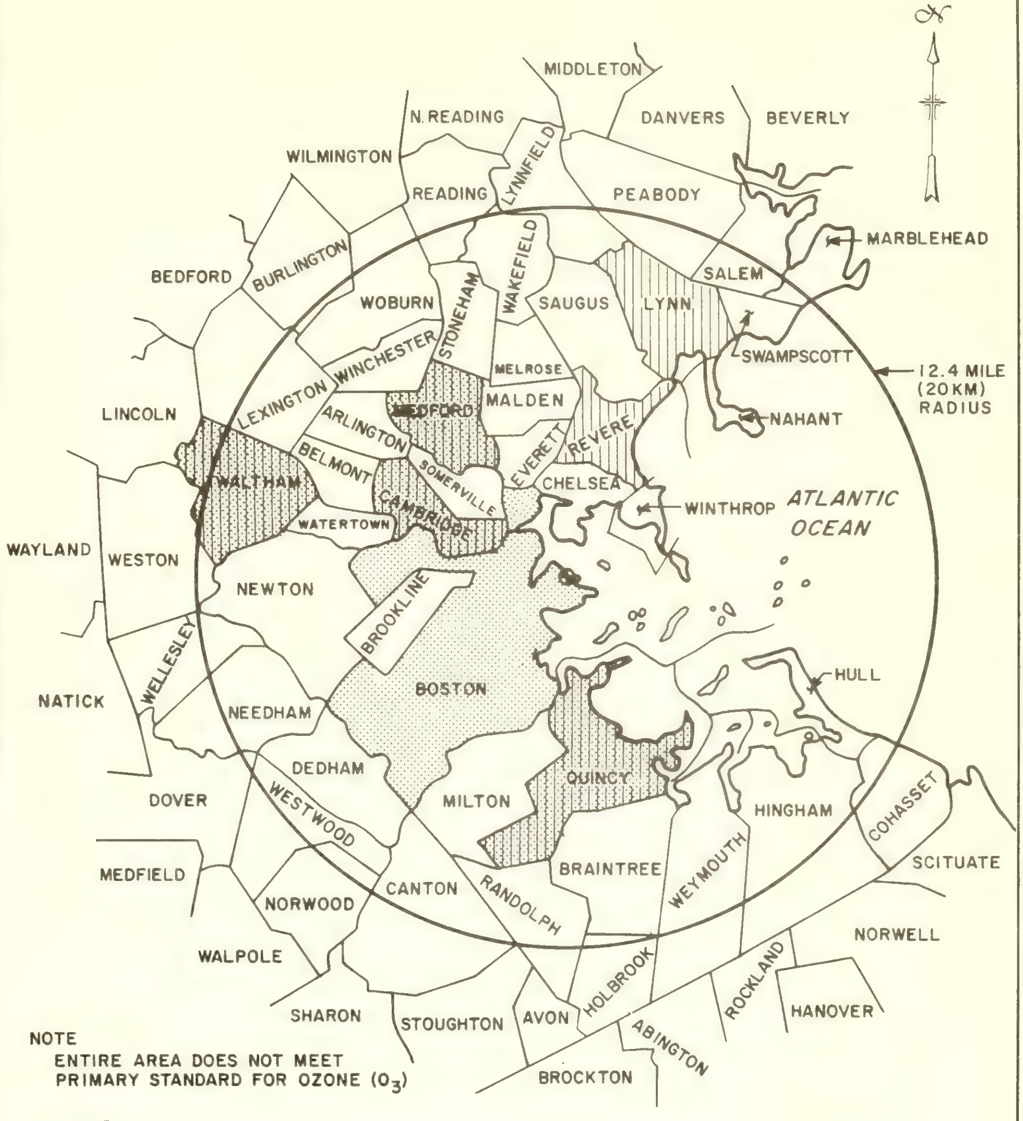


NOTE:

NUMBERS CORRESPOND TO AMBIENT AIR QUALITY MONITORING STATIONS IN TABLE 5.3-2

⊕ LOCATION OF PLANT

FIGURE 5.3-1
LOCATION OF AMBIENT AIR QUALITY MONITORING STATIONS WITHIN 12.4 MILES (20KM) OF NEW BOSTON STATION
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTE
ENTIRE AREA DOES NOT MEET PRIMARY STANDARD FOR OZONE (O_3)

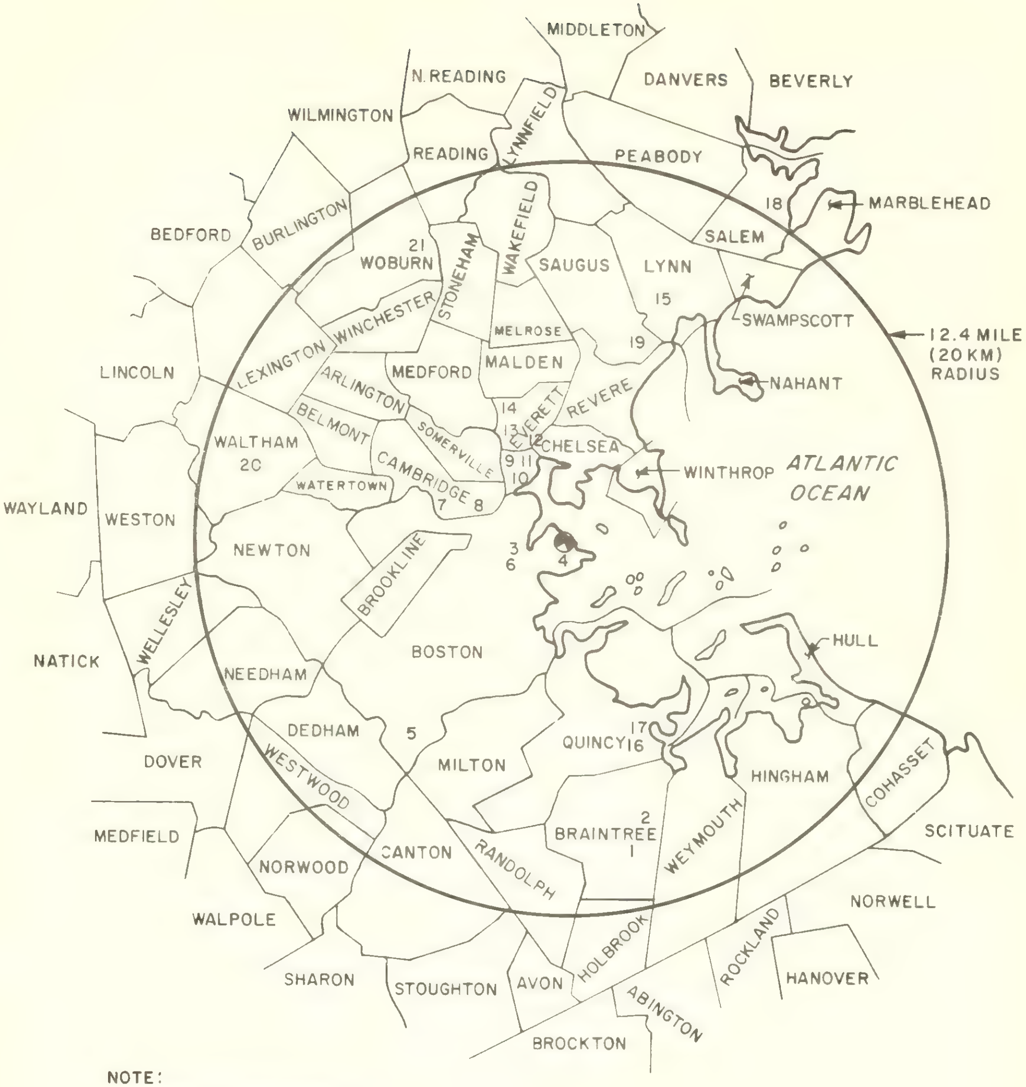
LEGEND:

- ● LOCATION OF PLANT
- ▥ TSP: DOES NOT MEET SECONDARY STANDARD
- ▒ CO: DOES NOT MEET PRIMARY STANDARD

FIGURE 5.3-2

AREAS OF NON-ATTAINMENT STANDARDS WITHIN 12.4 MILES (20 KM) OF NEW BOSTON STATION

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTE:

NUMBERS CORRESPOND TO MAJOR SOURCES LISTED IN TABLE 5.3-12

● LOCATION OF PLANT

0 5
SCALE- MILES

0 5 10
SCALE-KILOMETERS

FIGURE 5.3-3
LOCATION OF MAJOR SOURCES
OF PARTICULATES, SO_2, AND/OR NO_x
WITHIN 12.4 MILES (20 KM)
OF NEW BOSTON STATION
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

5.4 SURFACE WATER HYDROLOGY AND QUALITY

5.4.1 Surface Water Hydrology

The principal surface water features in the vicinity of the New Boston Station are the Reserved Channel and Boston Harbor. The Reserved Channel lies between Boston Harbor and Boston Inner Harbor. The Reserved Channel is approximately 650 feet wide and 5700 feet long. There are two small inlets on the station side of the channel. Inlet A is approximately 425 feet long and 330 feet wide, and Inlet B is approximately 525 feet long and 275 feet wide. Depths of the channel, including both inlets, are shown in Figure 5.4-1. The channel is designated by the U.S. Army Corps of Engineers as a 35-foot depth maintained channel. Results of a bathymetric survey performed for the Reserved Channel on November 8, 1982 indicate a shallowest depth of 32 feet below mean low water in the main channel, and considerably shallower depths in both inlets.

Water elevations for the Reserved Channel are dominated by Boston Harbor. Boston Harbor has a mean astronomical tide range of 9.5 feet and a spring tide range greater than 12 feet (FEMA 1981). Average tidal currents in the Reserved Channel are less than 0.1 knot (Wood 1982). Turbulence is strong in Inlet A due to flow through the New Boston Station's cooling water intake and discharge structures.

Storm surges in Boston Harbor are due primarily to hurricanes and northeasters. Northeasters have a greater effect on the coastal storm surge levels and, therefore, create the most extreme flooding events. A peak elevation-frequency relationship at the Commonwealth Pier tidal gauge has been established in a study for the Federal Insurance Administration (FEMA 1981). Selected storm-tide elevation recurrence intervals from that analysis are shown in Table 5.4-1. Figure 5.4-2 illustrates the 100-year floodplain in the New Boston Station vicinity. The 100-year floodplain inundates a large area of the Massachusetts Bay Transportation Authority (MBTA) property, but only the perimeters of the New Boston Station property. Greater than 100-year floods would inundate much more of the New Boston Station property since the area is flat and the 100-year surge elevation is close to the average site grade near the waterfront.

5.4.2 Surface Water Quality

The only surface water receiving effluent discharges from New Boston Station is the Reserved Channel of Boston Harbor. While no natural streams flow into the channel, there are inputs from storm drains and industrial sources as well as from combined storm and sewage discharges near the head of the channel.

5.4.2.1 Receiving Water Quality Standards

The Clean Water Act (Public Law 95-217) requires states to establish water quality standards for all navigable surface waters. The regulation and permitting of point source discharges (described in Section 3.1) provide the framework for achieving the water quality objectives listed in the receiving water standards.

The New Boston Station is located on a segment of Boston Harbor assigned a water quality classification of SC. Class SC waters are designated by the Massachusetts Department of Environmental Quality Engineering (DEQE), Division of Water Pollution Control (DWPC), for protection and propagation of fish, other aquatic life and wildlife, and for secondary contact recreation. General criteria for discharges of aesthetically undesirable pollutants, radioactive and tainting substances, color, turbidity, total suspended solids, nutrients, oil and grease, and numerical criteria for dissolved oxygen, temperature, pH, and total coliform bacteria have been assigned to waters of this class. Table 5.4-2 lists the minimum criteria (enforceable as standards) for this Boston Harbor segment.

5.4.2.2 Water Quality Parameters

Table 5.4-3 lists water quality parameters selected for review. The four classes of parameters (general water quality, aquatic nutrients, trace metals, and indicators of contamination by sanitary wastes) provide a comprehensive basis for describing the ambient Boston Harbor water quality near the New Boston Station.

5.4.2.3 Data Base and Location of Sampling Stations

Data which indicate temporal trends and spatial variability of water quality parameters were obtained to characterize Boston Harbor waters near the New Boston Station. Data from water quality surveys of Boston Harbor are listed in Table 5.4-4. The locations of sampling stations used in the surveys are shown in Figure 5.4-3.

Water quality trends and spatial variability in water quality parameters are indicated by comparison of EPA data from 1970 through 1972 (EPA 1982), and DWPC data from 1972 and 1982 (DWPC 1982).

5.4.2.4 Water Quality in Boston Harbor and the Reserved Channel near New Boston Station

Temperature

Water temperature influences the kinetics of chemical and biochemical reactions, limits dissolved oxygen concentrations, and is directly influenced by air temperature and thermal discharges. It is a criterion for Class SC waters.

The operation of the New Boston Station contributes heat to Reserved Channel waters. The existing National Pollution Discharge Elimination System (NPDES) permit thermal limitations for the discharge include a maximum effluent temperature of 96°F, and a maximum increase above the ambient water temperature of 25°F. Data presented in Table 5.4-4 include water temperatures recorded during the months with greatest solar radiation (July and August) and a 2-year period from 1970 to 1972. Little spatial variability is evident in this data. Temperature distributions in the water column during July and August provide evidence of good mixing in the vertical plane, as indicated in Figure 5.4-4.

Dissolved Oxygen

Dissolved oxygen (DO) concentrations in water are primarily attributed to input from photosynthetic activity and surface reaeration. Dissolved oxygen is significant in regulating the metabolic processes of aquatic organisms and communities. The solubility of dissolved oxygen is inversely related to the water temperature.

Data from 1970 through 1972 for sample stations 2 and 4 (see Table 5.4-4) indicate that the dissolved oxygen concentrations of Boston Harbor waters at these locations were in violation of the minimum criterion of 6.0 mg/l (see Table 5.4-2). More recent data at nearby sample station 6 indicate compliance with the criterion, with a minimum of 6.3 mg/l dissolved oxygen during July and August of 1982.

Chlorides

Chloride concentration provides a measure of seawater versus freshwater composition of estuary waters. It is not a criterion of Class SC waters. The chloride composition of standard seawater is 18,890 mg/l (CRC 1974-1975). Chloride concentrations in fresh water are much lower; a concentration of 250 mg/l is noticeable in taste, and most drinking waters are much less than 250 mg/l (EPA 1974). The data in Table 5.4-4 indicate that Boston Harbor waters near the project site are brackish. Sample station 2, located at the Reserved Channel and closest to New Boston Station, has a maximum chloride concentration of 16,000 mg/l, 81 percent greater than its average concentration, suggesting that the concentration is affected by both tidal flushing and sewage inputs at this location.

Oil and Grease

Oil and grease are man-made pollutants associated with industrial and municipal discharges of wastewater. Very limited oil and grease data are available for Boston Harbor waters near New Boston Station; an average concentration of 2.4 mg/l has been reported for sample station 5. The criterion for oil and grease is qualitative. Maximum levels of oil and grease are specified for petroleum discharges only (see Table 5.4-2).

NPDES effluent limitations for oil and grease in the New Boston Station wastewater treatment system discharge are 10 mg/l average daily (30-day average) and 15 mg/l maximum daily.

Alkalinity

Alkalinity measures the buffering capacity of a natural water to neutralize acidic inflows without a resulting dramatic shift in pH. It is not a criterion of Class SC waters. Boston Harbor data near sample station 2 indicate that the mean alkalinity is 147 mg/l as $CaCO_3$, with a minimum alkalinity of 62 mg/l as $CaCO_3$. The mean alkalinity of ocean water is typically about 115 mg/l (Sverdrup, Johnson, and Fleming. 1942).

pH

The water quality characteristic pH is defined as the negative logarithm of a water's hydrogen ion concentration (neutral pH equals 7). The pH may be altered by natural processes (photosynthesis, respiration), as well as by pollutant discharges. It is a criterion of Class SC waters.

The 1970-1972 data from sample station 1 presented in Table 5.4-4, when compared with the 1982 data for sample stations 5, 6, and 7, indicate no long-term pH changes in Boston Harbor near New Boston Station. The magnitude of pH at all locations is typical for ocean waters, ranging from neutral to slightly basic. The pH range is 6.2 to 8.3 standard units, and pH is generally within the criterion range of 6.5 to 8.5 standard units.

Trace Metals

Trace metals are defined as metallic elements present in concentrations of a few parts per million or less. Some are essential micronutrients for aquatic life at low concentrations, but toxic at higher concentrations. Copper shows typical behavior, in that it is essential for the growth of algae at a level of at least 30-40 ug/l, but toxic to algae at levels in excess of 0.4 mg/l (Manahan 1972). No specific water quality standards exist for trace metals in Class SC waters.

Data from 1982 are presented in Table 5.4-4 for 10 trace metals at sample station 5, which is the closest station to New Boston Station reporting trace metal data. The average reported concentrations of seven trace metals (aluminum, arsenic, cadmium, chromium, copper, mercury, and zinc) are less than 0.1 mg/l. Average concentrations of nickel and lead are 0.16 and 0.26 mg/l, respectively. Tin is present at the highest average concentration of all trace metals reported, 0.9 mg/l.

A review of other 1982 data collected in the inner harbor shows no significant spatial variation for any trace metal, indicating that trace metal levels near New Boston Station are typical of other inner harbor locations.

NPDES effluent limitations for trace metals in the New Boston Station wastewater treatment system discharge include 1 mg/l maximum daily and average daily limitations for iron and copper.

Bacterial Indicators of Pollution

Total and fecal coliform bacteria counts indicate the degree of water contamination from human or animal sanitary wastes. Fecal coliform bacteria originate in warm-blooded organisms and provide a more reliable indication of sewage discharges than total coliform data.

Class SC water quality criteria state the total coliform bacteria shall not average greater than 1000 mean probable number (mpn) per 100 ml. Boston Harbor, including the Reserved Channel, is subject to substantial coliform loading which has an adverse impact on water quality. Data presented in Table 5.4-4 for both 1972 and 1982 indicate that, while total and fecal coliform concentrations have diminished substantially over the past 10 years, concentrations are still in violation of Class SC criteria.

Inorganic Nutrients

Nutrients are necessary for the growth and survival of aquatic life. Their availability may limit the extent of photosynthetic activity, with compounds of nitrogen and phosphorus commonly the controlling nutrients. Table 5.4-4 summarizes the reported values for total nitrogen and total phosphorus.

Comparison of 1972 data with 1982 data for nitrogen indicates a substantial reduction of the concentrations of nitrogen in Boston Harbor waters near the New Boston Station. Current concentrations average approximately 1.4 mg/l for sample stations 5, 6, and 7.

Phosphorous concentrations have not changed with time, and average 0.1 mg/l at present.

Class SC water quality criteria for aquatic nutrients are assigned on a site-specific basis; no limits have been stipulated for the segment of Boston Harbor in the vicinity of New Boston Station. The current concentrations of nitrogen and phosphorus do not create an algae problem in Reserved Channel, but are high due to municipal and industrial discharges.

Total Suspended Solids (TSS)

Total suspended solids (TSS) or nonfilterable solids include viable and nonviable organic material, and inorganic particulates suspended in the water column.

Data in Table 5.4-4 indicate an increase in TSS in Boston Harbor from 1972 to 1982. Current levels of TSS average 31 mg/l for sample stations 5, 6, and 7.

Suspended solids for Class SC waters are required not to impair "the most sensitive water use". No quantitative criterion has been listed. NPDES effluent limitations for TSS in the New Boston Station wastewater treatment system discharge are 30 mg/l average daily (30-day average) and 100 mg/l maximum daily.

Other Water Quality Constituents

Other water quality constituents for which qualitative criteria have been established include aesthetics-impairing pollutants, color, turbidity, radioactive substances, and "other" constituents. No conclusions as to the compliance of ambient water quality with these standards are made because of limited available data.

5.4.2.5 Surface Water Quality Summary

Water quality of Boston Harbor in the vicinity of New Boston Station is brackish and subject to tidal exchanges. Heat is discharged from New Boston Station to the Reserved Channel. While this produces elevated temperatures in the vicinity of the outfall, discharge temperatures are generally in compliance with NPDES effluent limitations. Data presented in this section indicate levels of dissolved oxygen near New Boston Station are in compliance with the 6.0 mg/l Class SC criterion with the present operation of New Boston Station. The ambient pH data range indicates that alkalinity concentrations are adequate to buffer pH variations in effluents to the Reserved Channel and the Harbor. Current ambient pH ranges are within the Class SC criterion for Boston Harbor. The concentration of suspended solids is substantial, but reasonable for a well-mixed estuary. Nutrients and bacterial concentrations are high and are evidence of the discharge of municipal and industrial waste loads to Boston Harbor. Bacterial overloading of the Harbor has resulted in violation of the Class SC criterion and is the most stressed water quality parameter. Available data indicate all trace metals reported are present at less than 1 mg/l; nickel, tin, and lead are present in the greatest concentrations.

5.4.3 References

Chemical Rubber Company (CRC) Handbook of Chemistry and Physics. 55th edition, 1974-1975.

Manahan, S.E. Environmental Chemistry. Willard Grant Press. Boston, 1972.

Massachusetts Division of Water Pollution Control (DWPC). Boston Harbor 1982 Water Quality Survey Data, Wastewater Discharge Data. 1982.

Sverdrup, H.U.; Johnson, M.W.; and Fleming, R.H. The Oceans: Their Physics, Chemistry, and General Biology. Prentice-Hall, New York, 1942.

The Federal Emergency Management Agency (FEMA). Flood Insurance Study. City of Boston, Massachusetts, Suffolk County. October 1, 1981.

U.S. Environmental Protection Agency (EPA). Drinking Water Standards and Guidelines. Water Supply Division. 1974.

U.S. Environmental Protection Agency (EPA). STORET Data System Printout, Boston Harbor Region. 1982.

Wood, D. U.S. Army Corps of Engineers and Feinman, T.K. Stone & Webster Engineering Corp. Personal Communication. November 16, 1982.

TABLE 5.4-1

SUMMARY OF FLOOD ELEVATIONS

Flooding Source and Location	Elevations in Feet Above National Geodetic Vertical Datum* (NGVD)			
	10-yr	50-yr	100-yr	500-yr
Boston Harbor, Commonwealth Pier Tide Gauge	9.1	10.0	10.3	11.2

*The relationship between the datums at New Boston Station is as follows:

NGVD = 5.7 ft, Boston City Base datum (BCB)

Mean Low Water = 1.1 ft, BCB

Boston City Base = 0.0 ft

TABLE 5.4-2

MASSACHUSETTS WATER QUALITY STANDARDS (1978)

Classes for Coastal and Marine Waters

Class SC - Waters assigned to this class are designated for the uses of protection and propagation of fish, other aquatic life and wildlife, and for secondary contact recreation.

Minimum Criteria The following minimum criteria are adopted and shall be applicable to all waters of the Commonwealth.

These minimum criteria are applicable to all waters of the Commonwealth, unless criteria specified for individual classes are more stringent.

Parameter	Criteria
1. Aesthetics	All waters shall be free from pollutants in concentrations of combinations that: a) Settle to form objectionable deposits; b) Float as debris, scum, or other matter to form nuisances; c) Produce objectionable odor, color, taste, or turbidity; or d) Result in the dominance of nuisance species.
2. Radioactive Substances	Shall not exceed the recommended limits of the United States Environmental Protection Agency's National Drinking Water Regulations.
3. Tainting Substances	Shall not be in concentrations or combinations that produce undesirable flavors in the edible portions of aquatic organisms.
4. Color, Turbidity, Total Suspended Solids	Shall not be in concentrations or combinations that would exceed the recommended limits on the most sensitive receiving water use.
5. Oil and Grease	The water surface shall be free from floating oils, grease, and petrochemicals, and any concentrations or combinations in the water

TABLE 5.4-2 (Cont)

	column or sediments that are aesthetically objectionable or deleterious to the biota are prohibited. For oil and grease of petroleum origin, the maximum allowable discharge concentration is 15 mg/l.
6. Nutrients	Shall not exceed the site-specific limits necessary to control accelerated or cultural eutrophication.
7. Other Constituents	Waters shall be free from pollutants in concentrations or combinations that: a) Exceed the recommended limits on the most sensitive receiving water use; b) Injure, are toxic to, or produce adverse physiological or behavioral responses in humans or aquatic life; or c) Exceed site-specific safe exposure levels determined by bioassay using sensitive resident species.

Coastal and Marine Waters - the following additional minimum criteria are applicable to coastal and marine waters.

For Class SC waters:

1. Dissolved Oxygen	Shall be a minimum of 6.0 mg/l
2. Temperature	None except where the increase will not exceed the recommended limits on the most sensitive water use.
3. pH	Shall be in the range of 6.5-8.5 and not more than 0.2 units outside of the naturally occurring range.

TABLE 5.4-2 (Cont)

4. Total Coliform Bacteria	Shall not exceed a median value of 1000 mpn per 100 ml, nor shall more than 20% of the samples exceed 2500 mpn per 100 ml during any monthly sampling period, except as provided in 310CMR4.02 (1).

TABLE 5.4-3

SURFACE WATER QUALITY PARAMETERS SELECTED FOR REVIEW

General Water Quality

- Chloride
- Alkalinity, total
- Oxygen, dissolved
- pH
- Residue, total suspended or nonfilterable
- Temperature
- Oil and grease

Aquatic Nutrients

- Nitrogen, total
- Phosphorus, total

Indicators of Contamination

- Bacteria, total coliform
- Bacteria, fecal coliform

Trace Metals

- Copper
- Lead
- Nickel
- Mercury
- Zinc
- Aluminum
- Arsenic
- Cadmium
- Chromium
- Tin

TABLE 5.4-4

WATER QUALITY SURVEY DATA FOR BOSTON HARBOR NEAR NEW BOSTON STATION

		Reference	1	1	1	2	2	2	3
		Sample Station	6	7	5	1	2	3	4
Parameter	Units	Date	7/82 -8/82	7/82 -8/82	7/82 -8/82	6/70 -6/72	6/72 -8/72	9/72	6/72 -8/72
Dissolved Oxygen	mg/l	avg	7.5	8.7	6.2	9.60	2.28	ND	6.6
		min	6.3	7.8	4.9	0.0	0.0		5.8
		n	12	9	12	207	6		4
Temperature	°F	avg	65	64	65	48.4	62.7	ND	68
		max	68	67	71	72	69.0		69
		n	12	9	12	209	4		2
Chloride	mg/l	avg	12,000	14,500	11,000	ND	8,833	ND	13,800
		max	16,000	19,000	14,000		16,000		16,400
		n	4	6	4		6		4
pH	std units	avg	8.0	8.1	7.8	7.8	7.0	ND	7.7
		max	8.0	8.1	8.0	8.3	7.8		8.1
		min	7.9	8.1	7.6	7.0	6.2		7.4
		n	4	3	4	195	6		4
Nonfilterable Solids (TSS)	mg/l	avg	33	41	20	5.3	ND	ND	2.8
		max	47	58	25	9.1			4.0
		n	4	3	4	5			2
Total Kjeldahl Nitrogen, as N	mg/l	avg	1.26	1.33	1.65	ND	6.3	ND	1.2
		max	2.2	1.9	2.4		15.0		1.5
		n	4	3	4		6		3
Total Phosphorus as P	mg/l	avg	0.10	0.07	0.14	0.087	ND	ND	0.14
		max	0.18	0.16	0.24	0.524			0.20
		n	4	3	4	148			4
Total Coliform Bacteria	#/100 ml	avg	5,500	1,300	21,200	379	5,205,550	ND	71,700
		max	15,000	3,800	75,000	7,320	24,000,000		150,000
		n	4	3	4	198	6		4
Fecal Coliform Bacteria	#/100 ml	avg	500	140	4,000	ND	1,600,471	ND	11,800
		max	1,300	390	15,000		2,400,000		23,000
		n	4	3	4		6		4
Aluminum, Total	mg/l	avg	ND	ND	<0.1	ND	ND	ND	ND
		max			0.1				
		n			4				

TABLE 5.4-4 (Cont)

Parameter	Units	Reference Sample Station Date	1 6 7/82 -8/82	1 7 7/82 -8/82	1 5 7/82 -8/82	2 1 6/70 -6/72	2 2 6/72 -8/72	2 3 9/72	3 4 6/72 -8/72
Arsenic, Total	mg/l	avg	ND	ND	0.0041	ND	ND	ND	ND
		max			0.0082				
		n			4				
Cadmium, Total	mg/l	avg	ND	ND	0.04	ND	ND	0.28 (dissolved)	ND
		max			0.05			0.28 (dissolved)	
		n			4			1	
Chromium, Total	mg/l	avg	ND	ND	0.05	ND	ND	0.007	ND
		max			0.06			0.007	
		n			4			1	
Copper, Total	mg/l	avg	ND	ND	0.08	ND	ND	0.005	ND
		max			0.13			0.005	
		n			4			1	
Lead, Total	mg/l	avg	ND	ND	0.26	ND	ND	0.006	ND
		max			0.30			0.006	
		n			4			1	
Mercury, Total	mg/l	avg	ND	ND	<0.0001	ND	ND	ND	ND
		max			0.0001				
		n			4				
Nickel, Total	mg/l	avg	ND	ND	0.16	ND	ND	0.002 (suspended)	ND
		max			0.19			0.002 (suspended)	
		n			4			1	
Tin, Total	mg/l	avg	ND	ND	0.9	ND	ND	ND	ND
		max			1.1				
		n			4				
Zinc, Total	mg/l	avg	ND	ND*	0.04	ND	ND	0.026	ND
		max			0.05			0.026	
		n			4			1	
Oil & Grease	mg/l	avg	ND	ND	2.4	ND	ND	ND	ND
		max			4.0				
		n			4				

TABLE 5.4-4 (Cont)

		Reference	1	1	1	2	2	2	3
		Sample Station	6	7	5	1	2	3	4
Parameter	Units	Date	7/82 -8/82	7/82 -8/82	7/82 -8/82	6/70 -6/72	6/72 -8/72	9/72	6/72 -8/72
Alkalinity	mg/l	avg	ND	ND	ND	ND	147	ND	112
	$CaCO_3$	min					62		78
		n					6		4

NOTES:

Sample Station = As indicated in Figure 5.4-3
Date = Date samples obtained
ND = No data
avg = Average of values reported
min = Minimum of values reported
max = Maximum of values reported
n = Number of values reported

References:

1 Mass DEQE, DWPC, Technical Services Branch, Westborough, Mass, Boston Harbor 1982 Water Quality Survey Data, Wastewater Discharge Data, October 1982.

2 EPA Region 1, STORET Data System Printout, October 1982.

3 Mass DWPC, Metropolitan Regional Office, Boston Harbor Survey - 1972 Station No. 38 (cited in the Reserved Channel Marina ENF) 1972.

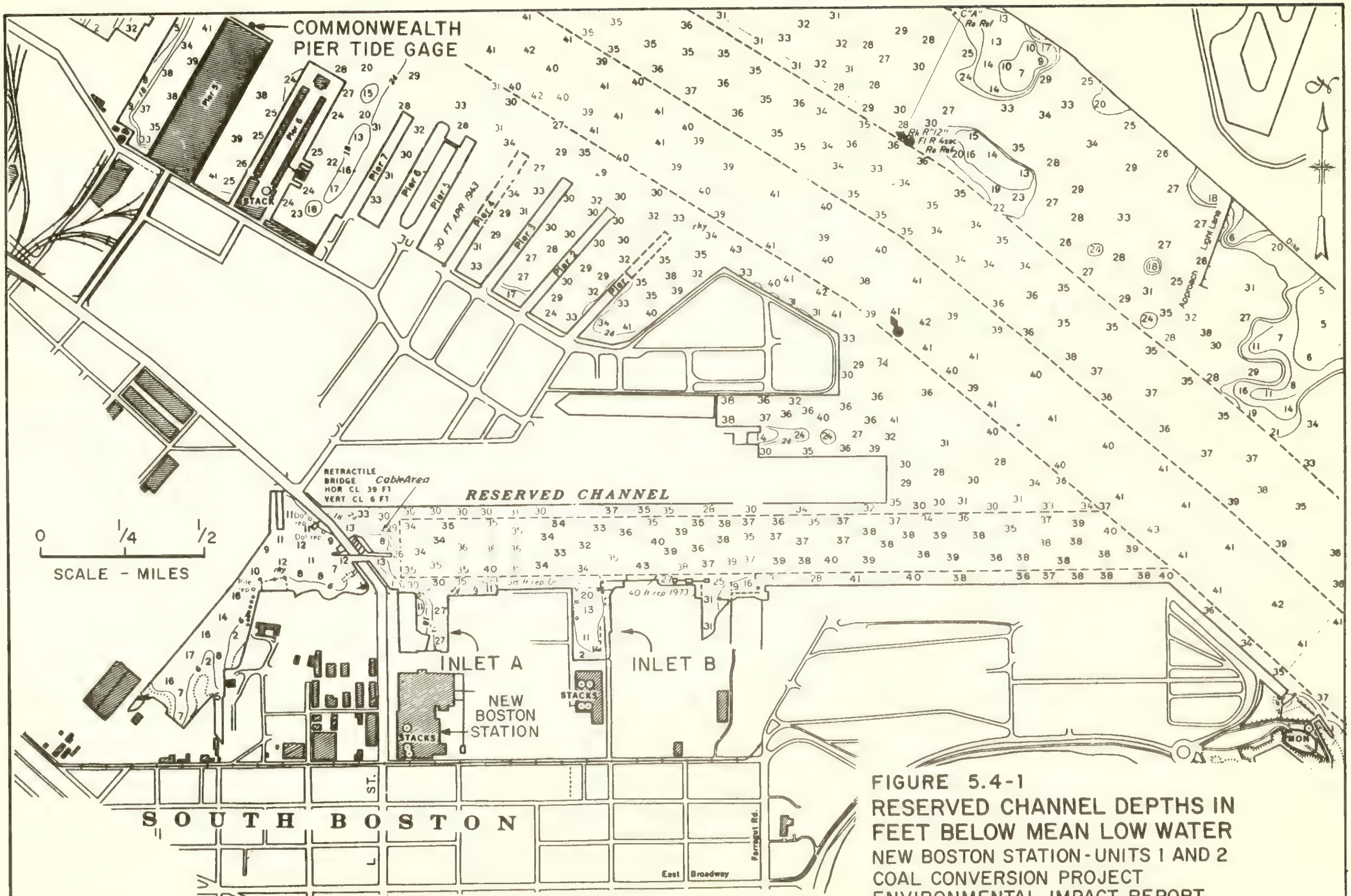


FIGURE 5.4-1
RESERVED CHANNEL DEPTHS IN FEET BELOW MEAN LOW WATER
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

NOTES:
1. RESERVED CHANNEL DEPTHS SURVEYED BY E G & G, NOVEMBER 1982
2. BOSTON HARBOR DEPTHS FROM NOS, NOAA CHART NO. 13272

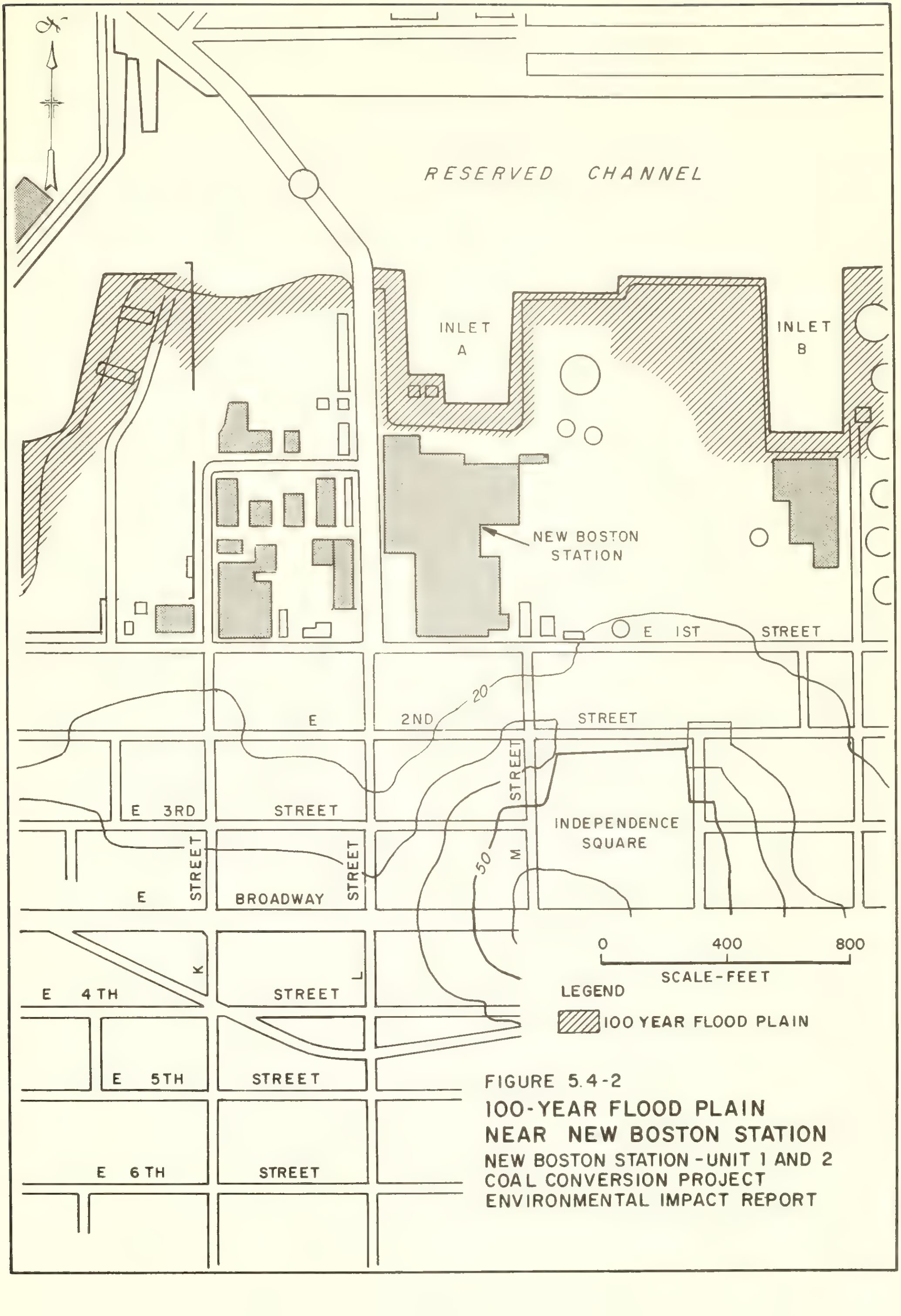
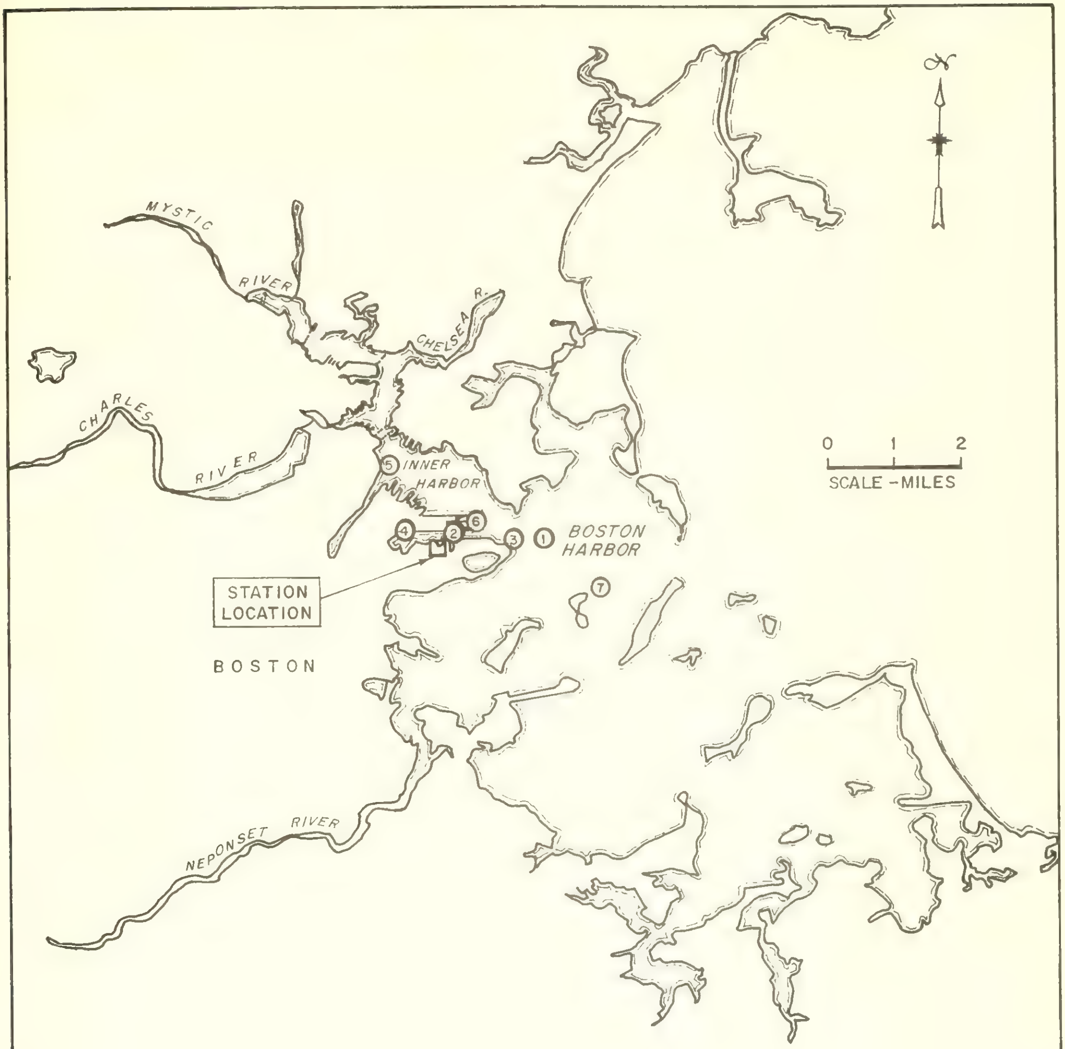


FIGURE 5.4-2

100-YEAR FLOOD PLAIN NEAR NEW BOSTON STATION

NEW BOSTON STATION - UNIT 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTE
SAMPLE STATION DATA IS
PRESENTED IN TABLE 5.4-4

FIGURE 5.4-3

BOSTON HARBOR LOCATION OF WATER SAMPLING STATIONS

NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

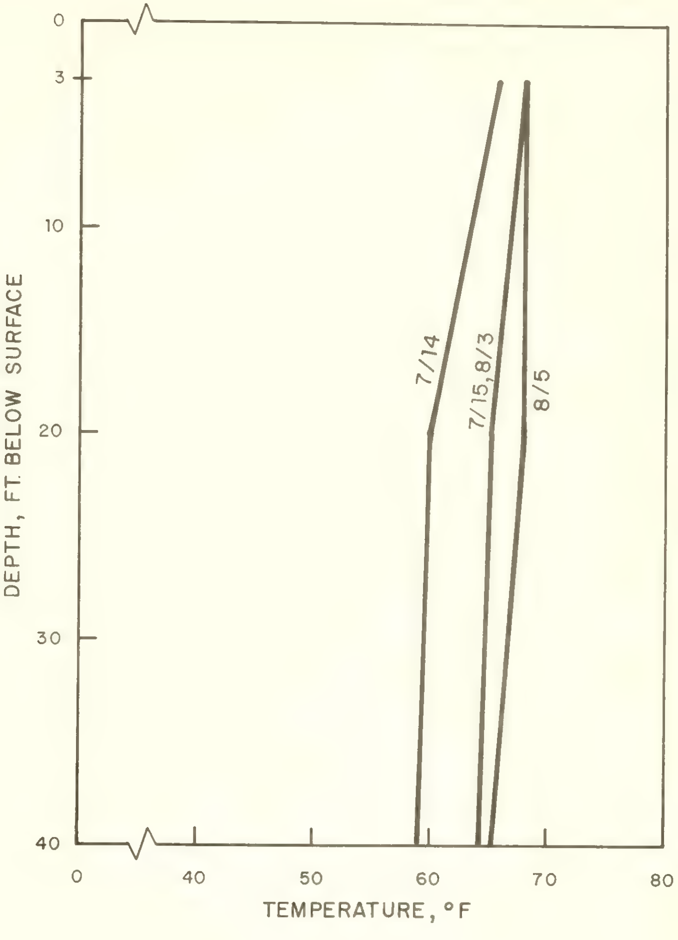


FIGURE 5.4-4

TEMPERATURE DISTRIBUTION WITH DEPTH AT SAMPLING STATION 6 DURING 4 DAYS IN JULY AND AUGUST 1982

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

5.5 GROUNDWATER HYDROLOGY AND QUALITY

5.5.1 Groundwater Hydrology

Groundwater in the South Boston area generally flows from the higher central portion toward the adjacent water bodies. Much of the upland south of New Boston Station and Massachusetts Bay Transportation Authority (MBTA) property is glacial till, a widely graded mixture of all or some of the following components: boulders, gravel, sand, silt, and clay. These materials have been consolidated to a dense consistency by the overriding glacier. Due to the soil type and its dense consistency, such glacial till is generally of low permeability and is not considered to be an aquifer. An aquifer is defined as a saturated permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic gradients. The post-glacial fill which occurs in many lowland areas, including the New Boston and the MBTA sites (Section 4.2.1), consists of moderately permeable materials and thus some precipitation percolates through the fill toward adjacent water bodies. There are no known groundwater uses within 0.5 mile of the New Boston Station.

The ground surface elevation along a north-south line extending through the New Boston Station at M Street rises from approximately 9 feet National Geodetic Vertical Datum (NGVD) at the Reserved Channel to approximately 26 feet NGVD at East First Street.

Groundwater levels have been recorded in several borings and observation wells at the Boston Edison Company (BECO) and MBTA sites (Geotechnical Engineers 1982). In borings in the vicinity of the New Boston Station power house, groundwater was encountered at an elevation of approximately 1 to 4 feet NGVD.

Near the wastewater holding basins located in the southeast portion of the BECO site, groundwater levels in observation wells 101 through 105 were at an elevation of approximately 2 feet NGVD, and fluctuated less than 0.3 foot through a tidal cycle (Geotechnical Engineers 1982). Depth to groundwater in these wells range from approximately 9 feet in well 105 to 24 feet in well 101. Well locations are shown in Figure 5.5-1.

Groundwater levels in borings in the southern portion of the MBTA site ranged from elevations of approximately 4 to 12 feet NGVD. The corresponding water depths are 15 to 2.5 feet below existing ground surface. The shallow water depths, at some points, may indicate water is perched above underlying impervious soils. These levels may not be indicative of the groundwater regime in this area (Geotechnical Consultants 1978).

Groundwater levels in the northern portion of the MBTA site, between the MBTA and BECO inlets, were at elevations of approximately 2 to -1 feet NGVD. These levels correspond to water depths of 7 to 10 feet below the existing ground surface (SWEC 1983).

5.5.2 Groundwater Quality

There are no known wells in the area of New Boston Station that supply groundwater for industrial or residential uses. The City water supply is imported by the Metropolitan District Commission (MDC) water system from Central Massachusetts.

Groundwater under the project site has been investigated recently by BECO. Five monitoring wells have been installed onsite. Well locations are illustrated in Figure 5.5-1.

5.5.2.1 Groundwater Quality Standards

The Massachusetts water quality standards do not address groundwater, although the Department of Environmental Quality Engineering (DEQE) has recently published (DEQE 1983) a Groundwater Protection Strategy to monitor and regulate impacts to this water source. No specific groundwater quality standards are associated with this document, which is discussed further in Section 7.3.2.3. A Discharge To Ground Permit is required for land disposal of wastewater in excess of 15,000 gallons per day (Massachusetts General Laws Chapter 21, Paragraph 43; Chapter 111, Paragraph 17). Discharges of this magnitude currently do not exist at New Boston Station, nor would they be anticipated for the coal conversion.

5.5.2.2 Groundwater Quality Parameters

Table 5.5-1 lists groundwater quality parameters selected for review, including general water quality, reduced metals commonly prevalent in groundwater, and trace metals.

5.5.2.3 Groundwater Quality at New Boston Station

Chloride

Chloride concentrations of freshwater and brackish saltwater differ by one to two orders of magnitude. In groundwater, higher concentrations of dissolved solids including chlorides may be found, compared to surface water. Data presented in Table 5.5-1 indicate that brackish water intrusion is limited to the monitoring point located nearest the Reserved Channel (see well 105 in Figure 5.5-1).

pH

The chemical qualities of groundwater and surface waters differ in two important areas: proton activity and electron activity. Proton activity refers to hydrogen ion activity, which is commonly reported as pH. Groundwater pH ranges are influenced by infiltration water quality and the geologic setting. Table 5.5-1 data indicate that the subsurface water pH values are less than 6.7, and average 5.2, i.e., weakly acidic (characterized by a hydrogen ion activity greater than that of neutral water). It is unlikely that this depressed pH is due to any station operations. The samples obtained nearest the Reserved Channel have the highest pH, with upgradient stations' pH values varying with time and location.

Reduced Metals Commonly Found in Groundwater

A water environment characterized by a high electron activity is a reducing medium which promotes the solubilization of metals. Groundwaters are commonly depleted of oxygen by microorganisms during percolation, which promotes this condition. Groundwaters with low pH and high electron activity are prevalent. Under these conditions, iron and manganese are ordinarily dominant due to their greater solubility. Data in Table 5.5-1 indicate relatively low concentrations of iron, with the exception of one sample point near the Reserved Channel. Since iron in seawater is <0.001 mg/l, this unique value is not likely to be the result of seawater intrusion (CRC 1974-1975). Manganese values are variable and location dependent.

Trace Metals

Trace metals in groundwater are subject to the same solubility influences as iron and manganese described above; however, concentrations encountered are usually much lower. Table 5.5-1 lists concentrations for six trace metals. Values reported are variable and location dependent. All concentrations are less than 1 mg/l for barium, less than 0.4 mg/l for arsenic, and less than 0.05 mg/l for chromium, mercury, lead, and cadmium.

5.5.2.4 Groundwater Quality Summary

The groundwater beneath New Boston Station can be described as largely freshwater with little saltwater influence. The groundwater also exhibits a consistently low pH (an acidic medium), varying with location and time. Metals solubilities thus vary with sample point and dates of samples.

5.5.3 References

Chemical Rubber Company (CRC). Handbook of Chemistry and Physics, 55th ed. 1974-1975.

Department of Environmental Quality Engineering (DEQE) Division of Water Supply, Groundwater Protection Strategy. January 1983.

Geotechnical Engineers, Inc. Summary of Subsurface Conditions at New Boston Station and Adjacent MBTA Power Property, South Boston, Massachusetts. Prepared for Boston Edison Company. 1982.

Geotechnical Consultants, Inc. Report on Subsurface Investigation and Foundation Recommendations, Massachusetts Bay Transportation Authority, Power Improvement Project, South Boston, Massachusetts. Prepared for Laramore, Douglass and Popham. 1978.

Stone & Webster Engineering Corporation (SWEC). Report on Subsurface Investigation for Preliminary Engineering, New Boston Station Units 1 and 2 Coal Conversion, Boston, Massachusetts. Prepared for Boston Edison Company. 1983.

TABLE 5.5-1

GROUNDWATER QUALITY AT THE NEW BOSTON SITE

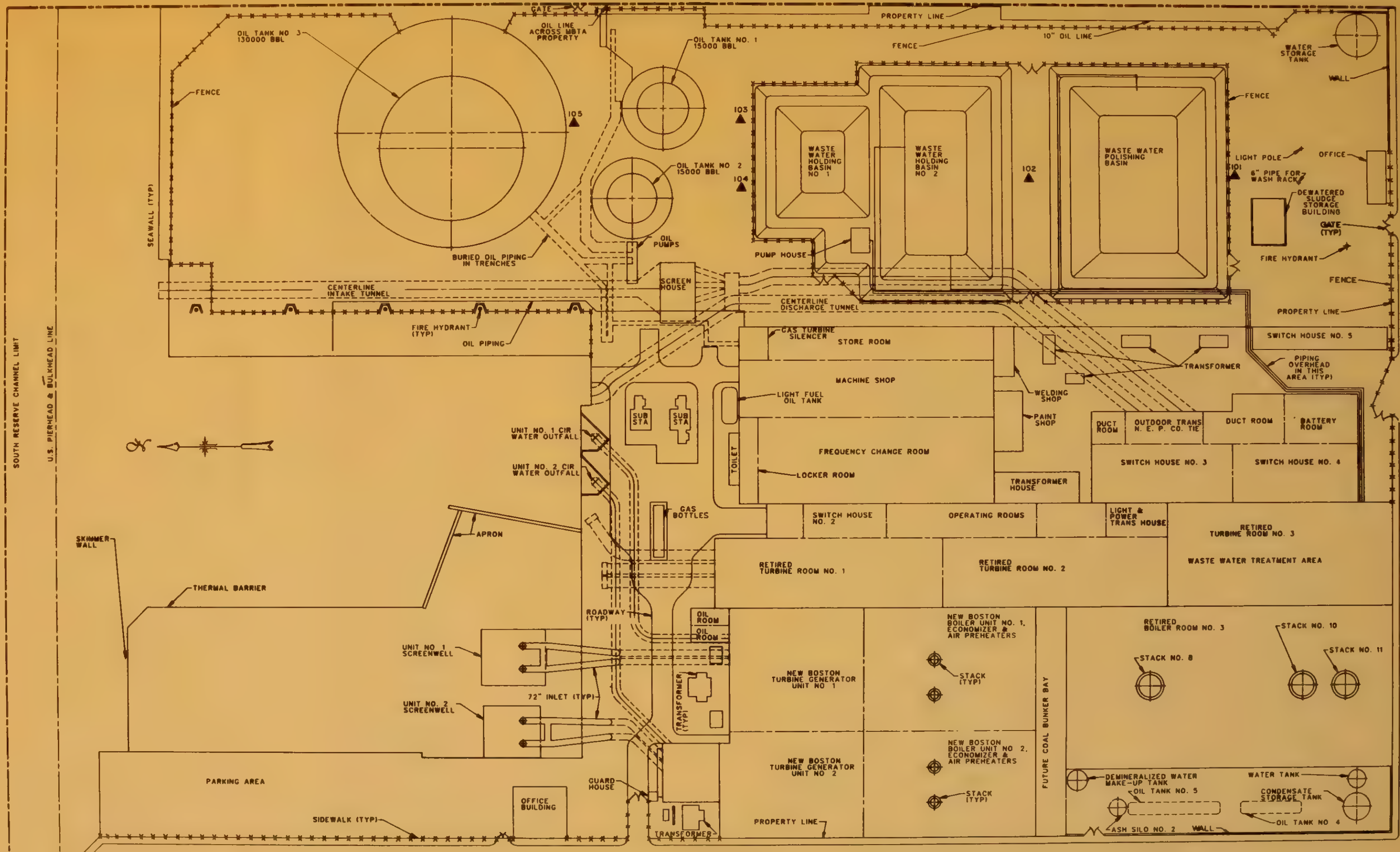
Location[3]	Average Values Per Reporting Period[1]									
	101	101	102	102	103	103	104	104	105	105
Date	11/81- 11/82	2/82- 4/82	11/81- 1/82	2/82- 4/82	11/81- 1/82	2/82- 4/82	11/81- 1/82	2/82- 4/82	11/81- 1/82	2/82- 4/82
Parameter										
Chloride (Cl)	47	66	142	116	373	328	284	207	833	395
Iron (Fe)	0.29	0.20	0.15	0.10	0.23	0.52	0.30	0.59	3.73	1.57
Manganese (Mg)	22.4	19.2	0.98	2.80	6.40	4.30	0.56	0.16	11.0	7.5
pH	4.7	6.4	4.1	5.3	4.4	4.6	5.8	6.7	4.8	4.8
Arsenic (As)	0.09	0.38	0.03	0.033	0.07	0.12	ND[2]	0.003	ND	0.02
Barium (Ba)	0.43	ND	0.43	0.20	0.33	0.30	0.33	0.20	0.54	0.20
Cadmium (Cd)	0.01	0.01	0.008	0.005	0.007	0.006	0.002	0.0009	0.008	0.004
Chromium (Cr)	ND	0.003	ND	0.001	0.003	0.001	ND	0.0004	ND	ND
Lead (Pb)	ND	0.015	ND	ND	ND	0.001	0.01	0.001	0.02	0.006
Mercury (Hg)	0.0005	0.0008	0.001	0.0007	0.006	ND	0.009	0.002	0.001	ND

SOURCE:

Boston Edison Company Groundwater Monitoring Program, New Boston Station

NOTES:

1. As mg/l except pH, which is standard pH units.
2. ND = No data
3. See Figure 5.5-1 for sample locations.



LEGEND

▲ = GROUNDWATER MONITORING WELL

0 40 80 120 160

SCALE - FEET

FIGURE 5.5-1
EXISTING GROUNDWATER MONITORING WELL LOCATIONS
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

5.6 TERRESTRIAL AND AQUATIC ECOSYSTEMS

5.6.1 Terrestrial Ecology

5.6.1.1 Regional Characteristics and Physiognomy

New Boston Station is located in Suffolk County, which lies within the lower New England physiographic region. The topography for the region is composed of irregular plains and the terrain is generally flat to gently rolling. The topography ranges from sea level to about 450 feet.

Precipitation in the region, which averages about 42 inches annually, is distributed fairly uniformly throughout the year. The growing season extends from May to October and averages approximately 180 days.

The natural physiognomy of Suffolk County was Appalachian oak forest (Kuchler 1964). Species such as white oak (Quercus alba) and northern red oak (Q. rubra) dominated the tall, broadleaf deciduous forests. Other components included red maple (Acer rubrum), sugar maple (A. saccharum), black birch (Betula lenta), American beech (Fagus grandifolia) and hickory (Carya spp.)(Kuchler 1964).

The natural forests were removed by early colonists over 2 centuries ago. The land was cleared for agriculture and the forests were cut for lumber, fuel, and ship timber. Disturbance continued until, by the 1830s and 1840s, the area was probably entirely residential. At this point, placement of fill was begun in the portion of the harbor on which the New Boston Station now stands (BRA 1979).

Suffolk County is not considered to have any commercial or noncommercial forests at present (Peters and Bowers 1977). However, forest land does exist in the surrounding areas including Middlesex and Norfolk counties. Commercial forest lands in both counties are dominated by elm-ash-red maple (Ulmus-Fraxinus-Acer rubrum), and oak-hickory (Quercus-Carya) types. White pine-red pine-hemlock (Pinus strobus-P. rigida-Tsuga) and oak-pine forest types are also common.

5.6.1.2 Site Vicinity Vegetation

A terrestrial survey was conducted at the New Boston Station site and its vicinity. The area surveyed is entirely industrial and urban residential, and contains no natural areas. Other than a small landscaped plot at the entrance to the station, the only notable vegetation on the site is a strip (about 10 feet wide) of black locust (Robina pseudoacacia) found between New Boston Station and the Massachusetts Bay Transportation Authority (MBTA) property to the east. Other than occasional grasses (Gramineae) and herbaceous weeds, the rest of the New Boston Station site is essentially devoid of vegetation.

To the south, the site borders on East First Street, which is lined on the other side of the street with small (about 20-foot high) ash trees (*Faxinus* sp.). Independence Square, located farther south, contains a variety of species, including silver maple (*Acer saccharinum*), London planetree (*Platanus acerifolia*), pin oak (*Quercus palustris*), linden (*Tilia americana*), and arborvitae (*Tuja occidentalis*). All appear to be planted trees and shrubs. Many of the trees in the residential area to the south are slippery elm (*Ulmus rubra*).

The MBTA property located east of New Boston Station is primarily black top or hard packed soil. Scattered weeds include grasses, goldenrod (*Solidago* spp.), and the aforementioned black locust trees.

A survey of the proposed construction period parking and laydown areas west of K Street was also conducted. The first area surveyed, located nearest to East First Street, contains a considerable amount of rubble and a variety of construction and manufacturing debris. A variety of herbaceous and woody pioneering species adapted to disturbed conditions are present. Vegetation is dominated by grasses and plants typical of old fields. Species present include common tansy (*Tanacetum vulgare*), wormwood (*Artemisia* sp.), wild carrot (*Daucus carota*), goldenrod, ragweed (*Ambrosia artemisiifolia*), brambles (*Rhus* sp.), yellow sweet clover (*Melilotus officinalis*), milkweed (*Asclepias syriaca*), dandelion (*Taraxacum* sp.), spiny-leaved sow-thistle (*Sonchus asper*), and other unidentified forbs. Woody species include tree-of-heaven (*Ailanthus altissima*), black locust, wild cherry (*Prunus serotina*), and an unidentified cherry (*Prunus* sp.).

The second area surveyed, located northeast of the first, is presently a storage yard for containers and dumpsters. The area is hard packed soil with little or no vegetation present.

5.6.1.3 Regional Wildlife

Faunal populations in Massachusetts have been well documented in the literature. Information on seasonal occurrence, abundance, distribution, and/or habitat preference for mammals, birds, reptiles, and amphibians is available. The available habitat generally determines what species of fauna occur in a given area. It is anticipated that only those species adapted to urban environments will be present in the region, because essentially none of Suffolk County is forested (Peters and Bowers 1977).

Mammals

Many of the 71 species of terrestrial mammals which occur in Massachusetts (Roth 1981; Burt and Grossenheider 1964) may be expected to occur in the large parks in the Metropolitan Boston area, such as Franklin Park, Arnold Arboretum, and Forest Hills Cemetery. However, the species occurring at these locations are essentially isolated from the New Boston Station site by approximately 4 miles of urban environment.

Those species which are adapted to urban environments and may occur in the vicinity of the New Boston site include the Norway rat (*Rattus norvegicus*), eastern gray squirrel (*Sciurus carolinensis*), and the house mouse (*Mus musculus*). Other mammals may occur at the site because of its proximity to Independence Square, Columbus Park, Marine Park, and Castle Island Park. These include striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and possibly three genera of bats (*Myotis, Pipistrellus*, and *Eptesicus*).

Birds

The bird species that are likely to occur at the New Boston Station site or in adjacent environs are also limited to those having a tolerance for the urban environment.

It is estimated that 298 species of birds occur in Massachusetts either as permanent residents, summer or winter residents, or fall or spring migrants (Peterson and Peterson 1980; Robbins et al 1966). Species associated with residential or urban areas, such as house sparrows (*Passer domesticus*), starlings (*Sturnus vulgaris*), chimney swifts (*Chaetura pelagica*), purple finches (*Carpodacus purpureus*), grackles (*Quiscalus quiscula*), and rock doves (*Columba livia*) are expected to occur. In addition to the above species, some of the birds which might be expected to inhabit the adjacent parkland and residential areas include the common flicker (*Colaptes auratus*), robin (*Turdus migratorius*), black-capped chickadee (*Parus atricapillus*), mockingbird (*Mimus polyglottos*), bluejay (*Cyanocitta cristata*), song sparrow (*Melospiza melodia*), red-winged blackbird (*Agelaius phoeniceus*), and cardinal (*Cardinalis cardinalis*). Other species which might be expected to occur include downy woodpecker (*Dendrocopus pubescens*), tufted titmouse (*Parus bicolor*), white-breasted nuthatch (*Sitta carolinensis*), common crow (*Corvus brachyrhynchos*), and as a winter migrant, the northern junco (*Junco hyemalis*).

The proximity of the Boston Harbor encourages the presence of waterfowl in the area. Herring gulls (*Larus argentatus*) and great black-backed gulls (*L. marinus*) are the most likely residents. Mallards (*Anas platyrhynchos*), black ducks (*A. rubripes*), double-crested cormorants (*Phalacrocorax auritus*), and other water fowl are possible seasonal visitors because of the presence of numerous migratory routes along the eastern seaboard.

Reptiles and Amphibians

Few, or no, amphibian or reptile species are expected to inhabit the site or its vicinity.

Game Species

Raccoon is the only potential game species which might inhabit the site or vicinity, although no hunting is permitted in the area.

Endangered and Threatened Species

No endangered species inhabit the New Boston Station site. The United States Department of the Interior (USDI) issues a list of species protected under the Endangered Species Act of 1973, as amended 1979. The list of floral and faunal species published in the Federal Register (U.S. Department of Interior 1980) is the official list of endangered species. This list currently contains three species of terrestrial vertebrates whose geographic ranges include Massachusetts.

1. Mammals

   The Indiana bat (Myotis sodalis) has been recorded from a single locality in Massachusetts (Clancy 1976). Although no individuals have been found in many years, it may still occur in the emery mines in Hampden County, Massachusetts. The mines have been given to the Massachusetts Division of Fisheries and Wildlife in an effort to protect remnants of the bat's population. It is unlikely that this species would be found on the New Boston Station site or in the adjacent environs.

2. Birds

   The bald eagle (Haliaeetus leucocephalus) and peregrine falcon (Falco peregrinus tundrius) are both listed as endangered. The bald eagle is characteristically a bird of seacoasts, large remote lakes, and river shores. Today, no known breeding populations are found in the state. There are records of the bald eagle as a migrant visitor to Mt. Tom and an irregular visitor throughout the state. Some have been observed to winter in the Quabbin Reservoir area, but few remain throughout the summer (Clancy 1976). An eagle release program conducted by the Massachusetts Division of Fisheries and Wildlife at the Quabbin Reservoir (two eaglets in 1982) is attempting to change this situation (Forster 1982;

Cronin 1982). The bald eagle is unlikely to occur in the Metropolitan Boston area.

Native breeding populations of the peregrine falcon have been completely extirpated throughout the eastern United States, and the species now occurs in the region as a spring and fall migrant. However, through a cooperative program between Cornell University and the U.S. Fish and Wildlife Service (FWS), genetic stocks of peregrines closely related to former eastern populations are now being reared and released in several northeastern states. Thus far, results are encouraging for the return of this species.

Although the peregrine does not breed in the area, at least one bird has wintered in Boston three times in the last 4 years (Forster 1982).

Of the vertebrates listed in Massachusetts as "threatened" (Ritzer and Franzen 1975), only one species, the Ipswich sparrow (Passercules princeps), could occur near the Boston area and this would be on the harbor islands, if at all. The sparrow, classified as a subspecies of the Savannah sparrow, breeds only on Sable Island, off the southern coast of Nova Scotia. It winters along beaches, sand dunes, and coastal marshes from Massachusetts to Georgia.

The Massachusetts Natural Heritage Program (Sanders-Fleming 1983) has no records of any rare plant or animal species populations or unusual plant communities within 2 miles of the site. Correspondence with the Massachusetts Natural Heritage Program is presented in Appendix B.

5.6.1.4 Environmental Stresses

Major environmental stresses which can alter growth and development of biota include plant diseases, insect pests, pesticides, fire, drought, winds, ice and snow, agricultural activities, air pollution, recreational activities and occasionally vandalism. At New Boston Station, the condition of the urban environment represents an existing stress for the limited biota existing there. Since the area is highly industrialized, there is little habitat available for vegetation. Vegetation present on the site or adjacent environs consists mainly of weedy invasion species. For the most part, such vegetation is capable of withstanding both natural and man-induced perturbations (e.g., mowing or clearing, dust from the movement of equipment or personnel, shading, lack of moisture, or air pollution). However, residential and park planting may be susceptible to adverse affects of the urban environment.

One aspect of air pollution, acid precipitation, is undergoing a considerable amount of investigation by the scientific community. For a review of the effects of acid precipitation on terrestrial ecosystems, refer to Section 5.8.

5.6.2 Aquatic Ecology

5.6.2.1 Introduction

The Reserved Channel is an embayment in South Boston at the southern end of Boston Harbor which was created when areas of the harbor were filled during the latter half of the 19th and early 20th centuries. While no natural streams flow into the channel, there are some inputs from storm drains and industrial sources in the area, as well as from a combined storm and sewage discharge near the head of the channel.

The Reserved Channel has been, and continues to be, utilized primarily for commercial shipping. The channel is periodically dredged to maintain depth in the designated 35-foot depth channel limits. No shellfishing is permitted because of contamination, but some shoreline sport fishing occurs.

The shoreline consists almost exclusively of bulkheads, piers, and pilings. Few areas of sediments are exposed at low tide. The water quality of Boston Harbor and the Reserved Channel is described in Section 5.4.2.

Aquatic ecology data on the Reserved Channel are very limited. However, studies conducted for Boston Edison Company (SWEC 1976) for the New Boston Station National Pollutant Discharge Elimination System (NPDES) permit by the Commonwealth of Massachusetts in nearby Dorchester Bay (Chesmore et al 1971), and by Massport for the Boston Marine Industrial Park (Jason M. Cortell Assoc 1980) provide information relevant to aquatic life in the vicinity of the station.

5.6.2.2 Invertebrates

Seven invertebrate genera were reported in samples taken during NPDES screenwell monitoring (Table 5.6-1). During the summer months (June through August), large concentrations of jellyfish (Aurelia aurita) were present, preventing sampling of other organisms. For the balance of the year, the green crab (Carcinus maenas) was the most abundant invertebrate collected.

Sampling done for Massport (Jason M. Cortell Assoc 1980) at the mouth of the Reserved Channel showed polychaete worms (Polydora ligni, Capitella capitata, Streblospio benedicti, and Caulleriella fillariensis) to be the predominant benthic forms. Also numerically important were tubificid oligochaetes which were predominant in nearby areas of the inner harbor. The benthic samples showed a considerable patchiness of distribution within each sampling area. When compared to outer harbor benthic populations, the samples showed low diversity and abundance, and a dominance by polychaetes, an indication that the Reserved Channel area is subject to some environmental stress.

5.6.2.3 Finfish

The fish collected in the 1975-1976 New Boston Station NPDES monitoring program are listed in Table 5.6-2. These data, however, exclude the summer months when no finfish were collected because of the abundance of jellyfish. Twenty-five taxa were identified, with the most abundant being the alewife (*Alosa pseudoharengus*) which represented 41 percent of the total catch, flounder - predominately winter flounder (*Pseudopleuronectes americanus*) at 18 percent, and rainbow smelt (*Osmerus mordax*) at 14 percent. Because no samples were collected in the summer, components of the finfish population which are abundant during the summer may not have been accounted for in the NPDES sampling. For example, striped bass (*Morone saxatilis*) and bluefish (*Pomatomus saltatrix*) have been caught by sport fishermen in the Reserved Channel (Kelley, Robert. Personal Communication). Based on shore station sampling in Dorchester Bay, Atlantic silverside (*Menidia menidia*) and mummichog (*Fundulus heteroclitus*) may also be components of the summer finfish community in the Reserved Channel. Since there are no freshwater streams entering the channel, this area is not a passageway for anadromous fish runs. In general, the Reserved Channel provides a finfish habitat similar to other areas of Boston Harbor.

5.6.2.4 Endangered and Threatened Species

None of the aquatic species listed as endangered or threatened by the U.S. Fish and Wildlife Service (U.S. Department of Interior 1980) were detected in NPDES monitoring (SWEC 1976), have been reported by other studies (Jason M. Cortell Assoc 1980), or would be expected to occur in the Reserved Channel. Similarly, the Commonwealth of Massachusetts (Ritzer and Franzen 1975) did not list any aquatic species which would occur in the channel as threatened, undetermined, peripheral, or uncommon.

The Massachusetts Natural Heritage Program (Sanders-Fleming 1983) has no data indicating the existence of any rare plant or animal species or unusual aquatic habitats within 2 miles of the New Boston Station. Correspondence with the Massachusetts Natural Heritage Program is presented in Appendix B.

5.6.3 References

Boston Redevelopment Authority (BRA). South Boston District Profile and Proposal 1979-1981 Neighborhood Improvement Program. BRA Neighborhood Planning Program, City of Boston, K. White, Mayor. 1979.

Burt, W.H. and Grossenheider R.P. A Field Guide to the Mammals. Houghton Mifflin Co. Boston, MA. 284p. 1964.

Chesmore, A.P.; Testaverde, S.A.; Richards, F.P. A Study of the Marine Resources of Dorchester Bay. Monograph No. 10. Division of Marine Fisheries, Department of Natural Resources, The Commonwealth of Massachusetts. 41 pages. 1971.

Clancy, J. A Look at Massachusetts Wildlife. Massachusetts Wildlife, 27(1): p 7-16. 1976.

Cronin, R. The Eaglets Have Landed. Massachusetts Wildlife, 28(3): p 1. 1982.

Forster, R. Massachusetts Audubon Society. Lincoln, MA. and Jacob, G.A. Stone & Webster Engineering Corp. Personal Communication (Telephone). 1982.

Jason M. Cortell and Associates, Inc. Final Environmental Impact Report, Seaport Development - Boston Marine Industrial Park. Massport, Boston, MA. 209 p and Appendices. 1980.

Kelley, Robert, Manager of Operations Section, Boston Edison Company and Post, D.R. Stone & Webster Engineering Corp. Personal Communication (Telephone) January 24, 1983.

Kuchler, A.W. Potential Natural Vegetation of the Coterminous United States. Special Publication No. 36. American Geographical Society. 104p. 1964.

Massachusetts Audubon Society. Undated. Daily Field Card.

Peters, J.R. and Bowers, T.M. Forest Statistics for Massachusetts, USDA Forest Service. Northeast Forest Experimental Station, Upper Darby, PA. Res. Bull. NE-48. 43p. 1977.

Peterson, R.T. and Peterson, V.M. A Field Guide to the Birds, East of the Rockies. Houghton Mifflin Co, Boston, MA. 384p. 1980.

Ritzer, H.J. and Franzen, R.W. Threatened Species of Massachusetts. U.S. Department of Agriculture, Soil Conservation Service, Amherst, MA. 1975.

Robbins, C.S.; Bruun, B.; Zim, H.S. and Singer, A. A Guide to Field Identifications: Birds of North America. Golden Press, NY. 340p. 1966.

Roth, C.E. An Annotated Field Check List of New England Mammals. Mass. Audubon Society. Lincoln, MA. 8p. 1981.

Sanders-Fleming, Alison. Environmental Review, Massachusetts Natural Heritage Program and Tuttle, D.G. Stone & Webster Engineering Corp. Personal Communication (Letter) January 7, 1983.

Stone & Webster Engineering Corporation. Fish Impingement Monitoring Program - L Street New Boston Station. NPDES Permit MA0004731. Boston Edison Company. 18 p. 1976.

U.S. Department of Interior, Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants. Republication of List of Species. Federal Register, Volume 45, No. 99, May 20, 1980.

U.S. Environmental Protection Agency (EPA). Inside EPA, Vol 3, No. 21. May 28, 1982. p 13. 1980.

TABLE 5.6-1

SPECIES LIST OF INVERTEBRATES OBSERVED IN SCREENWELL MONITORING AT NEW BOSTON STATION BETWEEN JUNE 1975 AND AUGUST 1976

Scientific Name	Common Name
Cnidaria	
Scyphozoa	
Aurelia aurita	jellyfish
Mollusca	
Bivalvia	
Mytilus edulis	blue mussel
Arthropoda	
Crustacea	
Callinectes sapidus	blue crab
Cancer irroratus	rock crab
Carcinus maenus	green crab
Crangon septemspinosa	sand shrimp
Echinodermata	
Asteroidea	
Asterias sp.	starfish

SOURCE:

Stone & Webster Engineering Corporation. 1976. Fish Impingement Monitoring Program - L Street New Boston Station. NPDES Permit MA0004731. Boston Edison Company. 18 pages.

TABLE 5.6-2

SPECIES LIST OF FISH OBSERVED IN NPDES SCREENWELL MONITORING AT NEW BOSTON STATION BETWEEN JUNE 1975 AND AUGUST 1976

Scientific Name	Common Name
Squalus acanthias Linnaeus	spiny dogfish
Raja sp.	skate
Anguilla rostrata (Lesueur)	American eel
Alosa aestivalis (Mitchill)	blueback herring
Alosa pseudoharengus (Wilson)	alewife
Brevoortia tyrannus (Latrobe)	Atlantic menhaden
Osmerus mordax (Mitchill)	rainbow smelt
Brosme brosme (Muller)	cusk
Gadus morhua Linnaeus	Atlantic cod
Merluccius bilinearis (Mitchill)	silver hake
Microgadus tomcod (Walbaum)	Atlantic tomcod
Urophycis chuss (Walbaum)	red hake
Fundulus sp.	killifish
Menidia menidia (Linnaeus)	Atlantic silverside
Syngnathus fuscus Storer	northern pipefish
Morone americana (Gmelin)	white perch
Morone saxatilis (Walbaum)	striped bass
Tautogolabrus adspersus (Walbaum)	cunner
Pholis gunnellus (Linnaeus)	rock gunnel
Peprilus triacanthus (Peck)	butterfish
Prionotus carolinus (Linnaeus)	northern searobin
Myoxocephalus aenaeus (Mitchill)	grubby

TABLE 5.6-2 (Cont)

Scientific Name	Common Name
Paralichthys dentatus (Linnaeus)	summer flounder
Scophthalmus aquosus (Mitchill)	windowpane
Pseudopleuronectes americanus (Walbaum)	winter flounder

SOURCE:

Stone & Webster Engineering Corporation. 1976 Fish Impingement Monitoring Program - L Street New Boston Station. NPDES Permit MA0004731. Boston Edison Company. 18 pages

5.7 AMBIENT NOISE LEVELS

Sound level surveys of the existing acoustical environment surrounding New Boston Station were conducted during the period of November 1 through 4 and on November 18, 1982. Sound level measurements were made within the property lines and in the nearby residential community in South Boston during both daytime and nighttime. The resulting baseline data indicated that the New Boston Station noise, as measured in the nearest community, did not comply with the City of Boston Noise Code. As a result of the survey findings, Boston Edison Company (BECO) initiated a noise abatement program for New Boston Station.

The goals of the program were to reduce continuous New Boston Station noise levels to noise code limits and BECO has already instituted some noise control measures to reduce continuous station noise. Additional noise surveys conducted in March and April of 1983 indicated that New Boston Station continuous noise levels have been significantly reduced since November 1982. Appendix A describes the 1982 noise surveys, the New Boston Station noise abatement program, the progress to date, results of the 1983 noise surveys, and planned follow-on work. The following subsections provide summaries on applicable noise regulations, survey methodology, and the ambient noise surveys of existing noise at New Boston Station.

5.7.1 Station and Community Description

New Boston Station is located on the Reserved Channel at the intersection of Summer and East First Streets, as shown in Figure 5.7-1, in a strip of industrially-zoned land on the northern edge of South Boston. Residential areas are located within 200 feet south of the New Boston Station property line. North of the station, the nearest area zoned residential is over several thousand feet away.

East First and West First Streets are designated truck routes. In addition, Summer and L Streets, as well as most adjacent and crossing streets, are used by trucks during the day. Heavy daytime commuter traffic exists, especially on L Street, Summer Street, and Broadway. The South Boston area is also located under a primary flight path for Logan Airport air traffic.

Potential noise sources from New Boston Station include forced draft fans for Units 1 and 2, and auxiliary equipment for Unit 2 which is located at ground elevation on the west side of the New Boston Station. A large access kinear door on Summer Street, when open, allows noise from this equipment to escape. New Boston Station noise also emanates from air inlet louvers located along the west wall of the power house at the mezzanine level of Unit 2. As indicated in Appendix A, the kinear door and air-inlet louvers will now be kept closed at all times. The main transformers are located on the north end of New Boston Station. There are also several transformers located on the east side of the retired L Street Station. Other noise sources include steam hiss and forced draft fan inlet noise at higher New Boston Station elevations. Sootblowers are also potential noise sources because of their outdoor location. Safety valves are potential sporadic major noise sources when venting steam.

5.7.2 Applicable Regulations

The nature of the existing noise environment surrounding New Boston Station is described and considered with regard to the conversion to coal of New Boston Station in relation to the Regulations for the Control of Noise in the City of Boston, as amended April 9, 1975. The City of Boston Regulations 3.2 through 3.5 identify the maximum property line noise levels, both in dBA and in octave band sound pressure levels, which shall not be exceeded for residential, residential/industrial (residential buildings in industrial zones), industrial, and business zone districts, as defined in and established pursuant to, the Boston Zoning Code. The Zoning District Noise Standards are discussed in subsequent sections and are included as applicable in Figures 5.7-3 through 5.7-13.

Department of Environmental Quality Engineering (DEQE) air pollution regulations (310CMR7.10) also contain two noise guidelines:

1. The broadband noise level shall not be increased in excess of 10 dBA above background (no station).

2. Puretone conditions shall not be produced (present if an octave band level is 3 dB higher than both adjacent octave band levels).

However, after BECO consultation with the DEQE, it was determined that the City of Boston noise regulations take precedence over DEQE noise regulation in assessing the noise impacts of New Boston Station.

5.7.3 Ambient Sound Level Survey Methodology

Sound level surveys were conducted in November 1982 and March and April 1983. Each sound level survey included collections of field data at preselected sound level measurement positions and reduction and analysis of the data. Eleven measurement positions were selected as representative of the existing acoustical environment in the community around New Boston Station. Three of those locations were next to the New Boston Station property line on Summer and East First Streets. A brief description of each location is given in Table 5.7-1. Figure 5.7-1 shows the position of each location relative to New Boston Station. The

1982 surveys included statistical noise measurements made on BECO property (position NBS-1) and were compiled in a time history in Figure 5.7-2. They are included here to illustrate the noise impacts of air and ground traffic, and to quantify the continuity of New Boston Station noise levels.

Bruel and Kjaer (B&K) 2215 sound level meters were used to measure the ambient A-weighted sound levels and residual octave band sound pressure levels at all measurement positions. A programmable noise analyzer (PNA) system sampled the acoustical environment 25 times per minute for 1-to-8 minute periods at each location. The A-weighted statistical sound level data were tabulated automatically by the PNA in the form of histograms. Octave band residual sound pressure levels were documented by observing the lowest sound pressure level in each octave band. Intermittent noise sources, such as local traffic, were excluded as much as possible to measure the minimum octave band levels. Measurements were made during favorable weather conditions with acceptable humidity and wind conditions . Tape recordings were made at each position for later laboratory narrowband anaylsis to identify typical spectral characteristics of the existing environment. A complete listing of the instrumentation used to collect and analyze the ambient sound level data is tabulated in Table 5.7-2.

Ambient sound level data were collected at the 11 measurement positions during both daytime periods (7 am to 6 pm) and nighttime periods (6 pm to 7 am). In general, at least two individual samples of the ambient sound levels at each measurement position were taken during day and night periods. Measurements were not taken repeatedly during daytime periods at locations 6, 9, and 10, due to the high volume of daytime commuter and truck traffic. Nighttime noise measurements were taken after midnight in most cases, to minimize intrusion of traffic and aircraft noise.

The L(90), L(50), L(10), L(1), and L(eq) sound levels were measured and tabulated in November 1982. The L(90) sound levels only were obtained during 1983 noise surveys. The L(90) (the level exceeded 90 percent of the time) is a descriptor of the ambient, or background level, below which sound levels seldom fall. L(90) is generally used as the level against which noise impacts are assessed. The L(50) (the level exceeded 50 percent of the time) describes the median sound pressure levels observed at the measurement position. The L(10) (the level exceeded 10 percent of the time) describes the intrusive sound levels, and is often used for traffic noise assessment. The L(1) (the level exeeded 1 percent of the time) represents the maximum sound levels that occur at the measurement position. The L(eq) is a measurement of the average acoustic energy received over a specific time period.

5.7.4 Sound Level Survey Results

The 1982 and 1983 sound level survey data are tabulated in Table 5.7-3 for each of the community measurement locations (Positions 1 through 11), including the measured L(90), L(50), L(10), L(1), and L(eq) levels along with a summary of the major noise sources audible at each location. Detailed discussions of noise levels at the individual measurement positions for the 1982 data are presented in Appendix A. The continuous station noise and existing ambient noise levels (as of March and April 1983) are discussed in the following sections.

In brief, the L(90) levels in 1982 around the New Boston Station property line were found to range from 77 dBA (on Summer Street) to 49 dBA (next to the L Street Station on East First Street). Forced draft fan and auxiliary equipment noise emanating from an open access door on Summer Street controlled the L(90) to the west and southwest of New Boston Station. L(90) levels on the east property line adjoining the Massachusetts Bay Transportation Authority (MBTA) property were measured from 57 to 60 dBA. Deaerator venting and steam noise controlled the L(90) to the east of the station.

Station property line nighttime L(90) levels were lowest after midnight, corresponding to an absence of traffic, aircraft, and other community noise as illustrated in Figure 5.7-2. The close similarity between the daytime and nighttime property line L(90) levels indicate that the station noise is controlling the L(90) at the property line and that it remains generally constant from day to night. Commuter and heavy truck traffic noise was clearly evident at all onsite locations and increased the usual plant-controlled L(90) by a few decibels, depending on location, from 7 am to midnight.

Since November 1982, the access kinear door has been closed and the deaerator vents have been silenced, as described in Appendix A.

The noise produced by the existing station is assessed in terms of the regulations of the City of Boston. Since New Boston Station produces relatively constant noise levels, its noise level may be quantified by the L(90) so as not to ascribe noise from other intermittent activities to New Boston Station. The discussions focus, therefore, on descriptions of the measured L(90) and octave band sound pressure levels with respect to the maximum allowable levels in the regulations of the City of Boston.

Typically, the L(10) level, as shown in Figure 5.7-2, indicates nearby traffic on East First Street and overhead aircraft flybys. In the absence of such off-station intermittent sources, the L(10) is controlled by station noise and becomes relatively constant within 2 dB of the L(90) residual level (from 11 pm to 7 am). Sporadic noise sources, however, such as safety valve steam releases, can occasionally result in significant increases in the L(10), as shown in Figure 5.7-2 between midnight and 1 am.

5.7.5 Community Measurements

Ambient sound level measurements made in the community surrounding New Boston Station showed L(90) values generally in the 50 to 60 dBA range in the daytime, dropping to between 40 and 50 dBA at night. Traffic and aircraft noise dominated all daytime community noise levels, but New Boston Station noise was audible and generally the controlling noise source in the community during the night. Comparisons of New Boston Station noise levels at each position with the City of Boston Noise Code reveals that the continuous station octave band sound pressure levels exceeded the code in the higher frequencies to varying degrees at some locations but that the overall dBA level was in compliance with the code. BECO is currently conducting a noise abatement program for New Boston Station and has already quieted station noise levels substantially, as measured in 1983 and compared with 1982 data. Additional work is underway, as discussed in Appendix A. Nighttime residual noise measurements made in 1983 are shown by location in Figures 5.7-3 through 5.7-13 and are discussed in the following sections. Daytime noise levels were taken from November 1982 surveys as they were dominated by traffic and were not remeasured in 1983, due to the predictability of traffic noise in the area.

Position 1 - Corner of East First and K Streets

Daytime L(90) levels were approximately 55 dBA and were controlled by commuter and heavy truck traffic noise. At night, the L(90) values dropped to between 45 and 48 dBA, with New Boston Station being the controlling noise source at approximately 800 feet. This is a residential area in an industrial zone so the station noise is in compliance with the City of Boston nighttime residential/industrial noise code of 55 dBA maximum noise level as well as the noise code octave band levels. The New Boston Station louvers and kinear door on Summer Street are kept closed to prevent forced draft fan and auxiliary equipment noise from impacting this and other measurement positions to the southwest of New Boston Station.

Position 2 - Corner of East Second and K Streets

Daytime L(90) levels were in the 52 to 56 dBA range, controlled (as at Position 1) by commuter and heavy truck traffic noise. At night, the L(90) dropped to between 44 and 47 dBA, with the station audible at approximately a 1000-foot distance. This is a residential area and the present New Boston Station noise is in compliance with the City of Boston nighttime noise code of

50 dBA. At times, the code octave band levels are exceeded by a few decibels in the 1000, 2000, and 4000 hertz (Hz) octave bands. For the most part, this happens only during operation of the abnormally noisy sootblower system, one of the New Boston Station noise sources being evaluated under the noise abatement program detailed in Appendix A.

Position 3 - Corner of East Second and L Streets

Daytime L(90) levels were in the 60 to 61 dBA range, controlled by commuter and heavy truck traffic noise. At night, the L(90) levels dropped to between 47 and 52 dBA, controlled by general station noise. Because Position 3 is a residential area in an industrial zone, the New Boston Station L(90) of between 47 and 52 dBA at that position is in compliance with the City of Boston nighttime residential/industrial code level of 55 dBA. Presently (April 1983) the City nighttime code levels are exceeded by one or two decibels in the 1000 and 2000 Hz octave bands, principally during operation of the sootblower system, which is being evaluated, as detailed in Appendix A.

Position 4 - On East Second Street, Halfway Between L and M Streets

Daytime L(90) levels were about 55 dBA, controlled by traffic noise. L(90) levels varied at night from 40 to 46 dBA. Despite its proximity the station was not distinctly audible at this location, due to shielding by residential homes, industrial buildings, and the retired L Street Station. The reading of 40 dBA at this location was the lowest dBA reading obtained during any survey.

Position 5 - Across from 15 M Street

Daytime L(90) levels ranged from 51 to 60 dBA and were influenced by ground and air traffic, with general station noise audible during brief traffic lulls. Nighttime L(90) levels were generally steady at 50 to 51 dBA, controlled by station noise, and in compliance with the nighttime residential zone noise code level of 50 dBA with the sootblower system off, as at Positions 2 and 3. Exceedences noted in the 500, 1000, 2000, and 4000 Hz octave band city code levels are suspected to be due to forced draft fan inlet noise, and are accentuated by operation of the sootblower system.

Position 6 - East First Street, 800 feet East of M Street

Daytime noise levels were in the low to mid 60s dBA and almost completely dominated by traffic noise and noise from a nearby playground area. In contrast, nighttime L(90) values were measured at 47 to 50 dBA. Again, at nighttime the station was heard as the controlling continuous noise source, and its noise level was in compliance with the residential code of 50 dBA. Exceedances were noted in the 500, 1000, 2000, and 4000 Hz octave bands, due in all likelihood to forced draft fan noise and operation of the sootblower system.

Position 7 - Corner of East Second and N Streets

Daytime noise levels were in the mid 50s dBA, controlled by traffic noise from aircraft, car, and truck traffic in the general area. Nighttime L(90) values dropped to between 49 and 50 dBA, controlled by general New Boston Station noise and in compliance with City of Boston noise code limit of 50 dBA. In the absence of other noise sources, some exceedences of the nighttime code were noted in the 500, 1000, 2000, and 4000 Hz octave bands for New Boston Station and are attributed principally to forced draft fan inlet noise based on preliminary findings of the noise abatement program described in Appendix A.

Position 8 - On East Broadway, Halfway Between M and N Streets

Daytime noise levels were dominated by traffic and measured between the high 50s and lows 60s dBA. Nighttime L(90) levels were 47 to 49 dBA and in the absence of other noise were controlled by New Boston Station noise. The nighttime residential dBA code level was not exceeded. Noise levels taken on March 23, 1983, complied with all octave band code limits as well. The 500 to 2000 Hz octave band code levels were occasionally exceeded at other times. However, it is not certain that this can be attributed to New Boston Station alone, since the noise abatement measures implemented in early 1983 have reduced higher frequency noise levels substantially. Other noise sources were audible much of the time at this position, including aircraft, distant traffic, and on April 7, a ship in the Reserved Channel.

Position 9 - On East First Street, Halfway Between L and M Streets

Daytime station noise levels were not logged at this location due to the prevailing high level of traffic noise. Nighttime L(90) levels were steady at 47 to 49 dBA and controlled by New Boston Station noise and some steam hiss from L Street Station. New Boston Station noise levels at this position were well below the industrial zone noise code levels.

Position 10 - Corner of L and First Streets

Daytime station noise levels were not obtained at this location due to the high level of traffic. Nighttime L(90) levels fell between 53 and 57 dBA. The New Boston Station was the controlling noise source at this position in the absence of aircraft flyovers or local traffic. As the industrial zone code levels apply to Position 10, the 70 dBA code level was not exceeded. The New Boston Station noise was in compliance with all octave band code levels.

Position 11 - On L Street, Across from Unit 2 Access Door

Daytime and nighttime L(90) levels fell between 67 and 69 dBA at this industrial zone location which complied with the industrial zone code level of 70 dBA. The octave band code levels were met for essentially all octave band measurements. This position is very close to the New Boston Station. Noise sources which may contribute to the noise level at this location include forced draft fan inlet noise, located at the top of the turbine building, and general boiler and turbine buildings noise.

5.7.6 Summary

Most of the nighttime residual ambient sound levels measured in March and April 1983, in the community, specifically those at Positions 1, 2, and 6 through 8, fell within the 45 to 50 dBA range with the residuals controlled by New Boston Station. Residual sound levels measured were at or under the City of Boston nighttime noise code dBA level at all locations. Octave band code limits were exceeded in the higher frequencies, primarily at location 5, 6, and 7. The measurements at Postions 3 and 5 were slightly higher than at other positions because they were relatively close to, and had a line-of-site view of, the station. Position 4 levels were several dB quieter than the rest because Position 4 was directly shielded from the station noise.

New Boston Station noise levels at positions 9 and 10 fell well within the City of Boston industrial zone code limits, while at position 11, within 50 feet of the New Boston Station turbine and boiler buildings, noise levels met (on March 23, 1983) or were within 1 dB of the City of Boston octave band code limits, and fell under the City code dBA limit for industrial zones.

Noise levels measured in March and April 1983 (following commencement of the BECO noise abatement program) at positions 1 through 11 were substantially lower than they were in November 1982, as discussed in Appendix A. Some of the remaining noise sources at New Boston Station which are being evaluated for noise abatement are the sootblowers and the forced draft fan inlets.

Another noise problem is safety valve steam venting. Steam venting noise, measured in November 1982, in the South Boston community (at positions 4 and 5), has raised the ambient noise levels by as much as 20 to 30 dBA. BECO has included safety valve noise mitigation in their noise abatement program and is currently reviewing study findings to determine the most appropriate course of action.

TABLE 5.7-1

SOUND LEVEL SURVEY LOCATIONS

Position	Zone	Location
NBS-1	-	Station property (MBTA property line)
1	Residential/ Industrial	Corner of East First and K Streets
2	Residential	Corner of East Second and K Streets
3	Residential/ Industrial	Corner of East Second and L Streets
4	Residential	On East Second Street, half-way between L and M Streets
5	Residential	On M Street, half-way between East First and East Second Streets
6	Residential	On East First Street, 800 feet east of M Street
7	Residential	Corner of East Second and N Streets
8	Residential	On East Broadway, half-way between M and N Streets
9	Industrial	On East First Street, half-way between L and M Streets
10	Industrial	Corner of Summer and East First Streets
11	Industrial	On Summer Street, 450 feet north of East First Street

TABLE 5.7-2

SOUND LEVEL SURVEY INSTRUMENTATION

A. Community Noise Analyzer (CNA) System

Instrument		Serial Number
B&K	Type 4426 Community Noise Analyzer	789622
w/	B&K Type 2312 Alphanumeric Printer	728201
	B&K Type 4165 1/2-inch Microphone	923301
	B&K Type 2619 Cathode Follower	805336
	B&K Type 4230 Calibrator	792543
	B&K 1/2-inch Microphone Windscreen	-

B. External Noise Metrologging System

Instrument		Serial Number
Metrosonics dB-652 Metroreader		1140
Metrosonics dB-301 Metrologger		1902
w/	301-14 PROM	-
	MK-301 R Pendant Microphone	40238
Metrosonics dB-301 Metrologger		1903
w/	301-34 PROM	-
	MK-301 R Pendant Microphone	40239
Metrosonics dB-301 Metrologger		1904
w/	301-14 PROM	-
	MK-301 R Pendant Microphone	40240
Metrosonics dB-301 Metrologger		1905
w/	301-34 PROM	-
	MK-301 R Pendant Microphone	40241
Metrosonics Cl-302 Calibrator		1691

C. Tape Recording System

Instrument		Serial Number
Nagra IV-SJ Tape Recorder		2179
w/	Nagra QJPA Microphone Preamplifier	278
	Nagra QJPA Microphone Preamplifier	476
	B&K Type 4165 1/2-inch Microphone	791257
	B&K Type 4165 1/2-inch Microphone	977346
	B&K Type 4230 Acoustic Calibrator	782537
	B&K 1/2-inch Microphone Windscreens	-

TABLE 5.7-2 (Cont)

D. Programmable Noise Analyzer (PNA) System

Instrument	Serial Number
B&K Type 2215 Precision Sound Level Meter	788613
B&K Type 2215 Precision Sound Level Meter	788614
w/ B&K Type 2804 Microphone Power Supply	815266
B&K Type 4165 1/2-inch Microphone	782543
Hewlett-Packard (HP) 3468A Multimeter	2137A0015
HP 41CV Computer	-
HP 82143A Peripheral Printer	-
HP-IL Interface Loop	-

E. Residual dBA and Octave Band System

Instrument	Serial Number
B&K Type 2215 Precision Sound Level Meter	788613
B&K Type 2215 Precision Sound Level Meter	788614
w/ B&K Type 4165 1/2-inch Microphone	782543
B&K Type 4165 1/2-inch Microphone	791257
B&K Type 4230 Acoustic Calibrator	782537
B&K 1/2-inch Microphone Windscreens	-

TABLE 5.7-3

SURVEY OF DAY AND NIGHT NOISE LEVELS

			Sound Pressure Level Data, dB, re 2 x 10^{-5} N/M^2										Statistical Data, L(N) in dBA					
Location	Date	Time	dBA	31.5	63	125	250	500	1K	2K	4K	8K	L90	L50	L10	L01	LEQ	Audible Noise Sources
								Station Property Measurements										
NBS-1	11/01/82	1524	59	61	64	60	56	58	51	51	47	39	60	61	70	76	66	Traffic, Station Noise
								Community Measurements										
1	11/01/82	1555	54	---------		too variable to record					-------		59	65	75	84	72	Traffic, Car/Truck Passbys
1	11/01/82	2550	55	59	58	60	53	47	46	42	33	19	56	57	60	69	59	Traffic, Car/Truck Passbys
1	11/02/82	1529	62	65	70	67	65	63	61	55	52	45	61	68	80	91	78	Truck Traffic, Woodworking Shop
1	11/03/82	0251	47	58	59	53	45	41	41	39	31	23	47	47	48	48	47	Station
1	11/04/82	0233	48	54	55	52	46	43	41	40	34	23	46	47	48	49	47	Quiet, Station
1	11/18/82	0105	48	61	57	56	49	45	42	37	28	13	48	49	58	65	55	Station, Traffic
1	03/23/83	0040	46	57	57	54	48	44	41	37	26	20	--	--	--	--	--	Station, Sootblower Wind
1	04/01/83	0034	45	58	57	53	46	42	42	39	34	16	--	--	--	--	--	Station, Sootblower Whistle & Squeal, Bus
1	04/07/83	0023	48	58	57	54	47	43	42	36	27	13	--	--	--	--	--	Station
1	04/07/83	0309	45	59	56	53	47	41	40	32	23	12	--	--	--	--	--	Station, Distant Traffic
2	11/01/82	1609	53	---------		too variable to record					-------		52	57	66	77	65	Traffic
2	11/01/82	2357	51	55	57	54	52	49	46	45	36	23	52	53	60	62	56	Station, Traffic
2	11/02/82	1533	58	58	61	60	55	55	54	46	39	27	56	61	68	70	63	Commuter Traffic
2	11/03/82	0256	49	54	56	52	47	43	41	41	34	25	48	48	49	50	48	Station
2	11/04/82	0238	46	52	51	48	45	41	40	39	33	22	45	46	46	47	46	Quiet, Station, One Car
2	11/18/82	0113	47	58	57	55	47	43	44	39	30	14	48	48	52	52	50	Station, Traffic
2	03/23/83	0100	44	56	54	50	45	41	38	31	21	14	--	--	--	--	--	Station, Wind

TABLE 5.7-3 (Cont)

			Sound Pressure Level Data, dB, re 2 x 10^{-5} N/M²										Statistical Data, L(N) in dBA					
Location	Date	Time	dBA	31.5	63	125	250	500	1K	2K	4K	8K	L90	L50	L10	L01	LEQ	Audible Noise Sources
2	04/01/83	0104	47	56	57	50	44	41	39	37	27	15	--	--	--	--	--	Station
2	04/07/83	0038	45	58	57	52	47	43	42	37	29	13	--	--	--	--	--	Station
2	04/07/83	0317	44	57	58	52	44	41	38	31	21	11	--	--	--	--	--	Station, Some Wind
3	11/01/82	1621	60	--------- too variable to record -------									60	64	68	78	66	Traffic, Bus, Aircraft
3	11/02/82	0004	56	65	62	58	52	51	50	50	43	30	57	59	63	68	60	Station, Occasional Cars
3	11/03/82	1544	61	62	64	59	56	too variable to record					60	64	71	81	68	Commuter Traffic, Aircraft
3	11/03/82	0301	55	64	67	58	54	50	50	49	42	30	55	56	56	56	56	Station Noise
3	11/04/82	0246	54	58	62	55	52	49	49	48	44	34	54	55	61	67	57	Station, Airplane
3	11/18/82	0121	54	64	64	58	52	49	49	47	39	23	54	54	57	65	56	Station, Occasional Passbys
3	03/23/83	*	52	62	60	56	51	49	46	40	30	23	--	--	--	--	--	Station, Drain, Wind, Bus
3	04/01/83	0121	50	63	64	56	49	47	47	41	33	22	--	--	--	--	--	Station, Car Passbys, Sootblower, Aircraft
3	04/07/83	0049	52	64	61	54	49	46	45	41	32	16	-	--	--	--	--	Station, Idling Grey-house Bus
3	04/07/83	0325	47	63	61	55	47	46	41	36	28	15	--	--	--	--	--	Station, Wind, Sewer Water
4	11/01/82	1633	51	--------- too variable to record -------									55	59	70	83	68	Aircraft, Cars, Children at play
4	11/02/82	0018	56	54	52	52	50	52	50	52	49	32	57	58	60	61	58	Station Steam Venting
4	11/03/82	0409	41	52	51	46	39	35	34	30	25	16	41	41	41	49	42	Quiet
4	11/04/82	0253	45	50	51	48	46	42	38	35	29	19	44	45	46	46	45	Quiet
4	03/23/83	*	45	55	53	47	45	43	40	33	22	15	--	--	--	--	--	Station, Local Noise
4	04/01/83	0130	40	55	54	46	39	36	36	30	18	14	--	--	--	--	--	Quiet, Transformer Hum Sootblower Just Audible

TABLE 5.7-3 (Cont)

			Sound Pressure Level Data, dB, re 2×10^{-5} N/M^2										Statistical Data, L(N) in dBA					
Location	Date	Time	dBA	31.5	63	125	250	500	1K	2K	4K	8K	L90	L50	L10	L01	LEQ	Audible Noise Sources
4	04/07/83	0104	42	56	53	51	45	42	36	27	16	11	--	--	--	--	--	Transformer Hum
4	04/07/83	0331	46	55	53	48	45	43	37	28	16	11	--	--	--	--	--	Station, Aircraft, Traffic
5	11/01/82	1633	51	--------- too variable to record -------									--	--	--	--	--	Commuter & Truck Traffic
5	11/02/82	0026	51	58	57	62	51	49	44	42	35	24	54	62	83	84	77	Station, Steam Venting Noise
5	11/02/82	1555	60	62	64	64	60	55	51	49	43	35	60	64	70	75	66	Trucks, Aircraft, Athletic Field
5	11/03/82	0417	51	58	59	56	48	46	46	45	41	31	51	51	52	52	51	General Station Noise
5	11/04/82	0257	53	56	56	54	50	47	46	47	44	34	52	53	55	56	54	Station, One Car
5	11/18/82	0131	53	62	63	61	53	50	47	44	38	19	59	54	54	55	59	Station
5	03/23/83	0146	50	62	60	57	50	48	45	39	31	19	--	--	--	--	--	Station, Steam Noise, Sootblower, Tones
5	04/01/83	0142	50	61	62	60	48	47	45	42	33	17	--	--	--	--	--	Station, Sootblower, PRV
5	04/07/83	0118	51	60	60	57	49	48	47	43	37	20	--	--	--	--	--	Station, Transformer, Airport
5	04/07/83	0338	50	59	60	59	50	47	45	38	27	13	--	--	--	--	--	Station, Aircraft
6	11/02/82	0102	52	60	59	51	50	50	48	45	38	22	52	53	55	60	53	Deaerator Vents, Occasional Traffic
6	11/02/82	1605	--------- no data ---- kids & traffic -------										63	67	75	87	72	Trucks and Cars, 20-25/minute
6	11/03/82	0424	49	59	59	52	46	43	43	41	35	23	49	49	50	51	49	Station
6	11/04/82	0302	54	57	57	52	49	49	46	46	42	30	52	53	54	55	53	Deaerator Venting
6	03/23/83	0230	50	61	60	55	51	48	45	37	25	14	--	--	--	--	--	Station, Transformer Hum
6	04/01/83	0152	No Data Obtained - Transformer Malfunction Nearby															

TABLE 5.7-3 (Cont)

			Sound Pressure Level Data, dB, re 2×10^{5} N/M^{2}										Statistical Data, L(N) in dBA					
Location	Date	Time	dBA	31.5	63	125	250	500	1K	2K	4K	8K	L90	L50	L10	L01	LEQ	Audible Noise Sources
6	04/07/83	0138	49	61	59	53	46	46	45	41	30	13	--	--	--	--	--	Station, Sootblower PRVs, Transformers
6	04/07/83	0345	47	61	58	52	45	42	41	37	26	12	--	--	--	--	--	Station, Transformer East
7	11/02/82	0109	53	61	59	53	50	52	47	46	39	25	52	53	56	61	54	Station, Occasional Traffic
7	11/02/82	1613	54	65	62	60	56	55	48	45	39	27	56	58	65	67	61	Kids, Aircraft Traffic
7	11/03/82	0431	47	59	58	52	45	43	42	41	35	21	47	47	48	49	48	Station
7	11/04/82	0306	51	57	63	57	52	50	46	45	40	28	51	53	59	62	56	Airplane, Station
7	11/18/82	0142	51	59	60	53	50	49	45	41	34	15	51	51	52	53	51	Station, Deaerator Vents
7	03/23/83	0250	49	61	59	54	52	49	44	37	24	14	--	--	--	--	--	Station, Traffic, Steam Leak?
7	04/01/83	0156	48	60	61	56	46	44	43	39	25	14	--	--	--	--	--	Station, Sootblower PRV, Aircraft, Some Traffic
7	04/07/83	0149	49	60	59	54	46	47	45	39	30	13	--	--	-	--	--	Station, Sootblower PRVs
7	04/07/83	0353	49	60	59	53	47	44	44	36	23	13	--	--	--	--	--	Station, Traffic, Noise
8	11/02/82	0124	51	57	57	51	48	54	45	41	33	18	51	55	65	72	61	Station, Tanker (Tone), Traffic
8	11/02/82	1623	57	62	64	59	56	53	too much traffic				60	66	71	86	70	Commuter Traffic, Tanker (Tone)
8	11/03/82	0439	45	54	55	51	42	41	39	36	29	16	45	48	66	76	64	Station
8	11/04/82	0312	47	52	52	47	44	43	42	41	35	19	47	48	53	67	54	Station, One Passby
8	11/18/82	0150	51	58	59	51	50	48	45	40	27	15	50	51	57	71	57	Station, Car Passbys
8	03/23/83	**	47	58	57	54	47	44	40	33	23	15	--	--	--	--	--	Station, Transformer, Hum, Wind & Litter
8	04/07/83	0212	49	58	61	57	50	47	45	37	21	12	--	--	--	--	--	Station, Traffic, Air-

TABLE 5.7-3 (Cont)

			Sound Pressure Level Data, dB, re 2 x 10^{-5} N/M^2										Statistical Data, L(N) in dBA					
Location	Date	Time	dBA	31.5	63	125	250	500	1K	2K	4K	8K	L90	L50	L10	L01	LEQ	Audible Noise Sources
																		craft, Transformers
8	04/07/83	0400	48	60	59	56	49	46	45	36	20	12	--	--	--	--	--	Tanker Noise; Station Audible
9	11/02/82	0137	50	58	56	55	48	45	43	42	37	34	50	50	53	57	51	L St Steam Hiss, Station
9	11/03/82	0447	48	60	57	54	51	45	42	39	35	34	48	48	52	54	49	L St Steam Hiss, Station
9	11/04/82	0318	50	55	55	52	48	47	45	43	38	37	50	50	51	51	50	L St Steam Hiss, Station
9	03/23/83	**	49	64	60	56	49	45	41	37	30	29	--	--	--	--	--	No Comments Made
9	04/07/83	0229	48	61	56	52	48	44	42	41	35	33	--	--	--	--	--	Station, Transformers, Steam Hiss
9	04/07/83	0407	47	62	55	54	45	42	40	37	31	32	--	--	--	--	--	Station Transformers, Steam Hiss
10	11/02/82	0145	60	68	65	61	59	54	54	53	47	38	60	60	65	68	62	General Station Noise
10	11/03/82	0246	61	68	68	64	60	56	54	54	48	36	60	61	61	62	61	General Station Noise
10	11/04/82	0228	59	64	65	62	58	54	53	52	48	39	59	61	70	82	69	General Station Noise
10	03/23/83	0020	57	67	66	63	57	53	51	46	35	27	--	--	--	--	--	Station, Sootblower System, Idling Bus
10	04/07/83	0301	53	69	68	61	53	49	45	40	32	21	--	--	--	--	--	Station, Bar Air-Conditioning
11	11/01/82	2345	76	80	80	79	75	73	71	71	64	53	77	77	78	78	77	Station FD Fans, Auxiliary Equipment
11	11/02/82	1515	76	77	80	79	75	73	68	68	61	51	75	76	78	88	77	Station FD Fans, Auxiliary Equipment
11	11/03/82	0240	77	83	82	80	75	73	72	72	66	55	78	78	78	79	78	Station FD Fans, Auxiliary Equipment
11	11/04/82	0215	77	75	78	79	79	71	71	71	65	55	77	77	77	77	77	Station FD Fans, Auxiliary Equipment

TABLE 5.7-3 (Cont)

			Sound Pressure Level Data, dB, re 2 x 10^{-5} N/M²										Statistical Data, L(N) in dBA					
Location	Date	Time	dBA	31.5	63	125	250	500	1K	2K	4K	8K	L90	L50	L10	L01	LEQ	Audible Noise Sources
11	03/23/83	0000	69	82	82	74	69	64	61	57	49	40	--	--	--	--	--	Station - Sootblower System Audible
11	04/01/83	0023	69	81	82	75	71	66	62	58	50	39	--	--	--	--	--	Station, Car Passbys, No Wind
11	04/07/83	0007	67	80	83	75	68	63	60	58	54	42	--	--	--	--	--	Station
11	04/07/83	0256	68	80	79	78	70	63	61	58	53	41	--	--	--	--	--	Station Noise

NOTES:

* Readings taken between 1:00 am and 1:46 am
** Readings taken between 2:50 am and 3:30 am

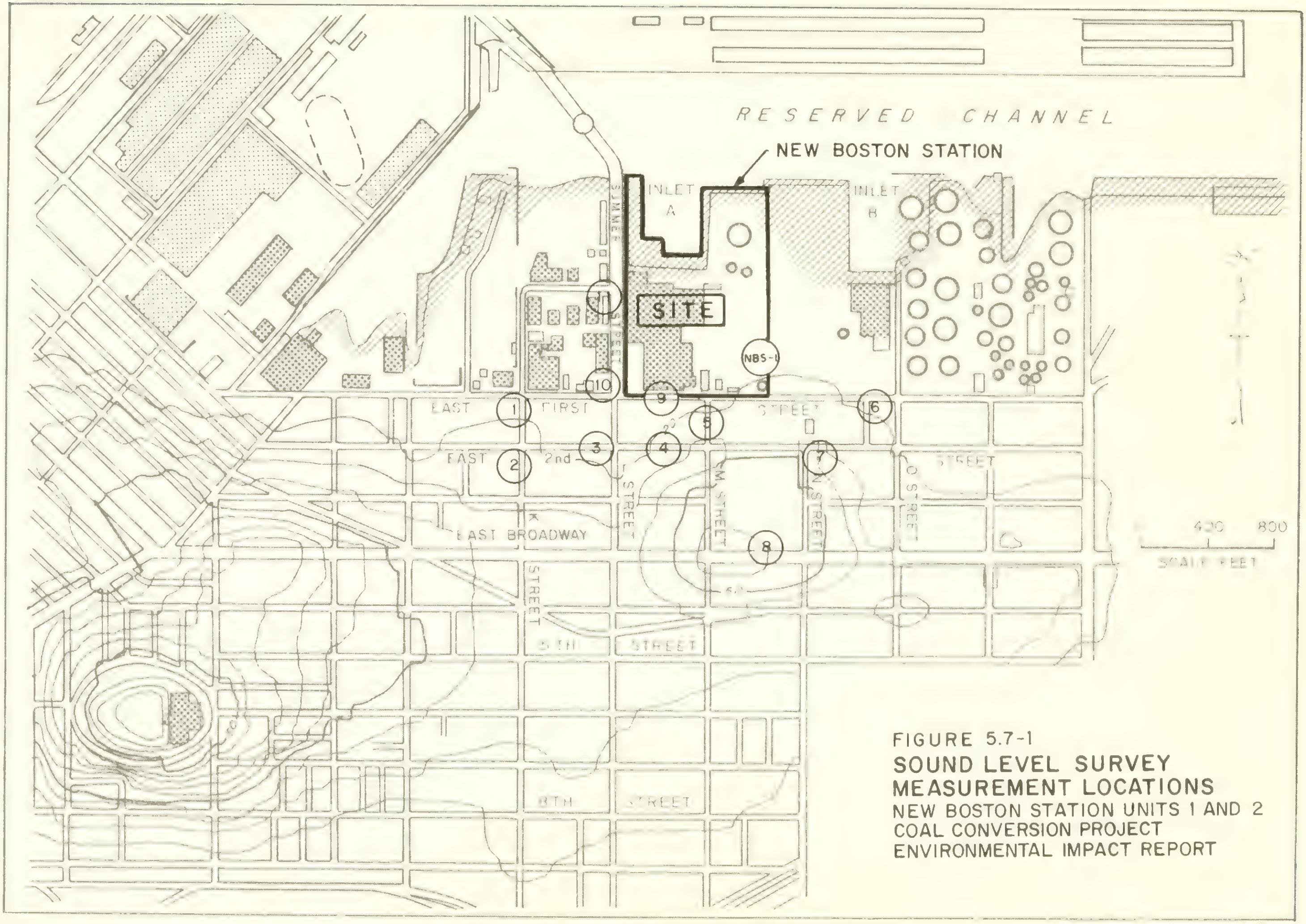


FIGURE 5.7-1
SOUND LEVEL SURVEY
MEASUREMENT LOCATIONS
NEW BOSTON STATION UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

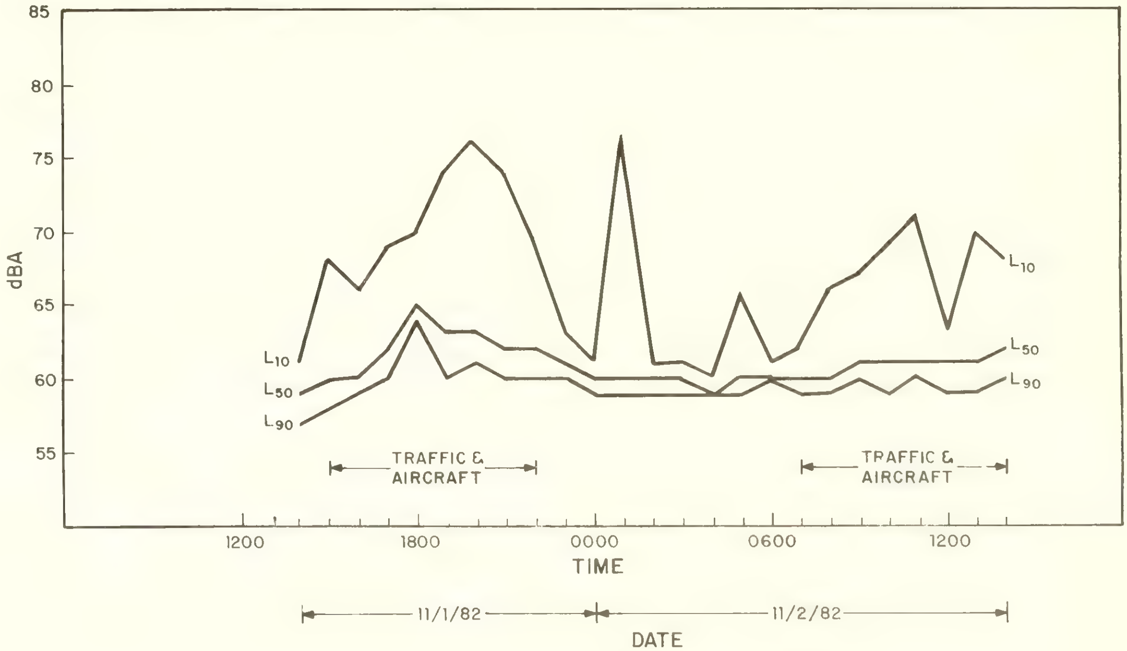


FIGURE 5.7-2

STATISTICAL TIME HISTORY OF L_{90}, L_{50}, AND L_{10} LEVELS AT LOC. NBS-1 (HOURLY AVERAGES)

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

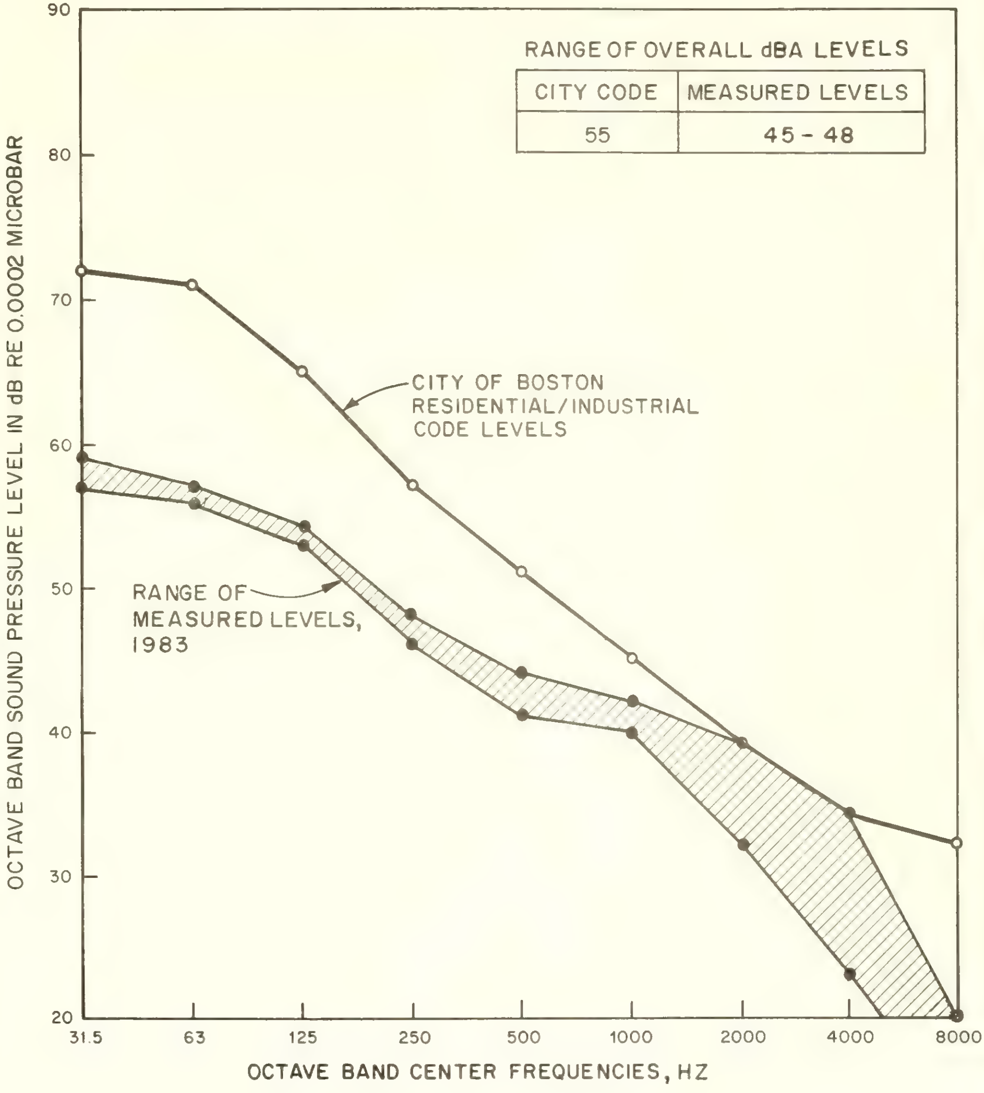
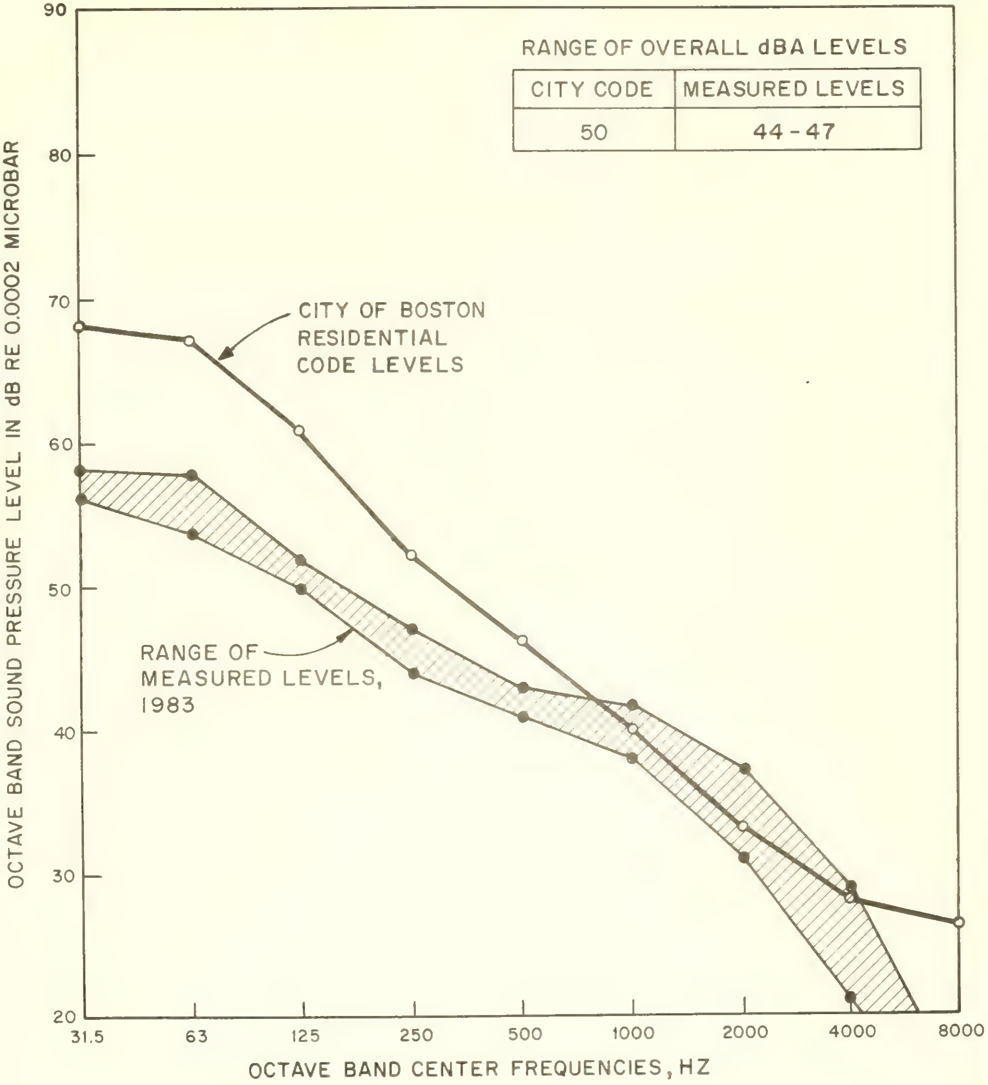


FIGURE 5.7-3

RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 1 (ZONE: RESIDENTIAL/INDUSTRIAL)

NEW BOSTON STATION UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



CITY CODE	MEASURED LEVELS
50	44 - 47

FIGURE 5.7-4

RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 2 (ZONE: RESIDENTIAL)

NEW BOSTON STATION UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

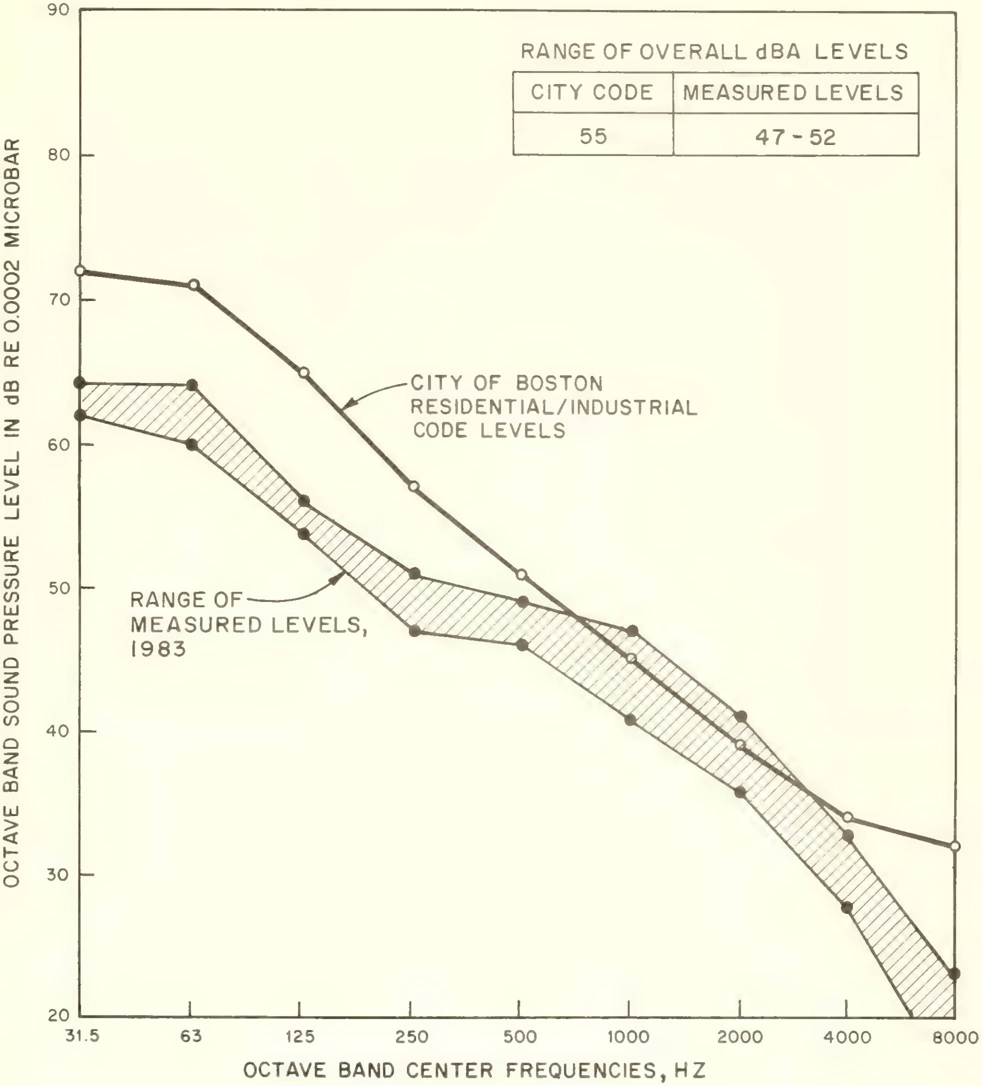


FIGURE 5.7- 5

RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 3 (ZONE: RESIDENTIAL/INDUSTRIAL)

NEW BOSTON STATION UNITS I AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

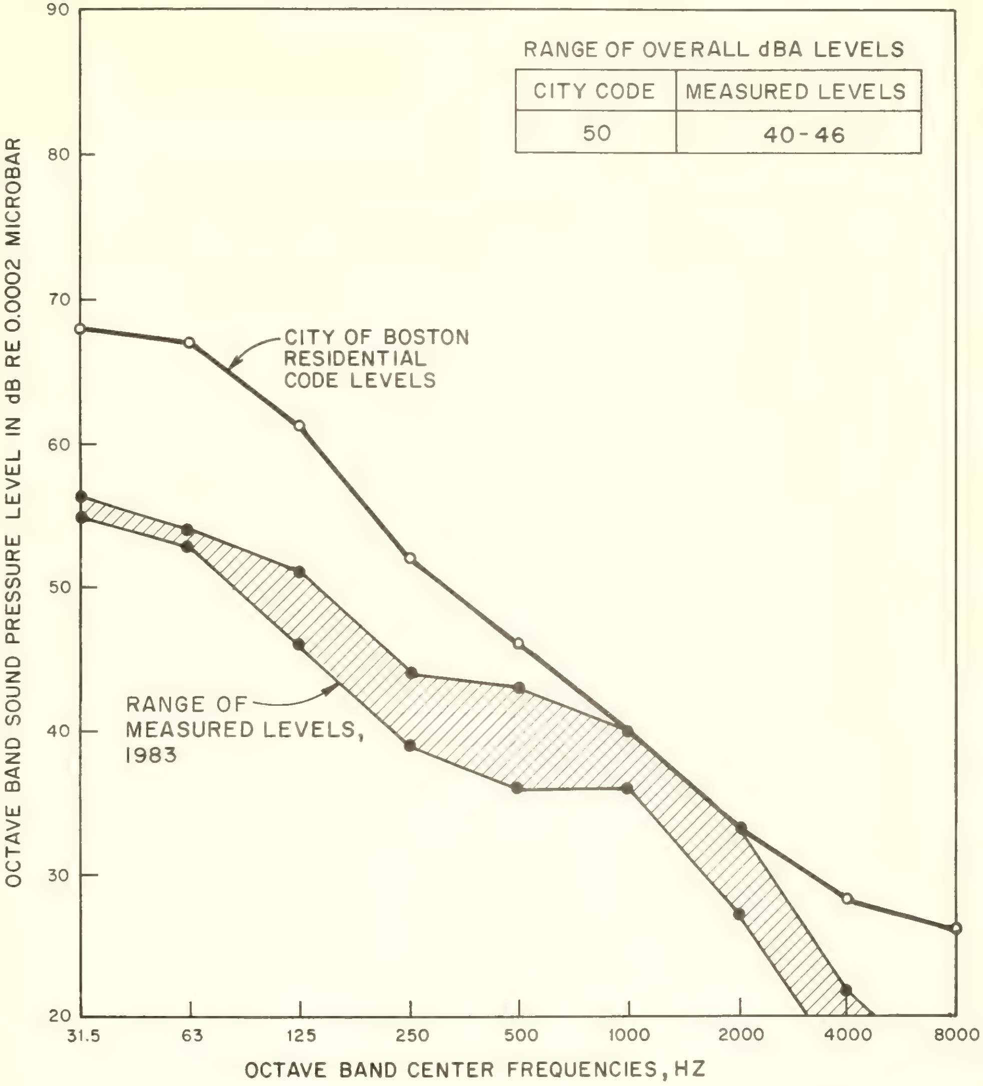
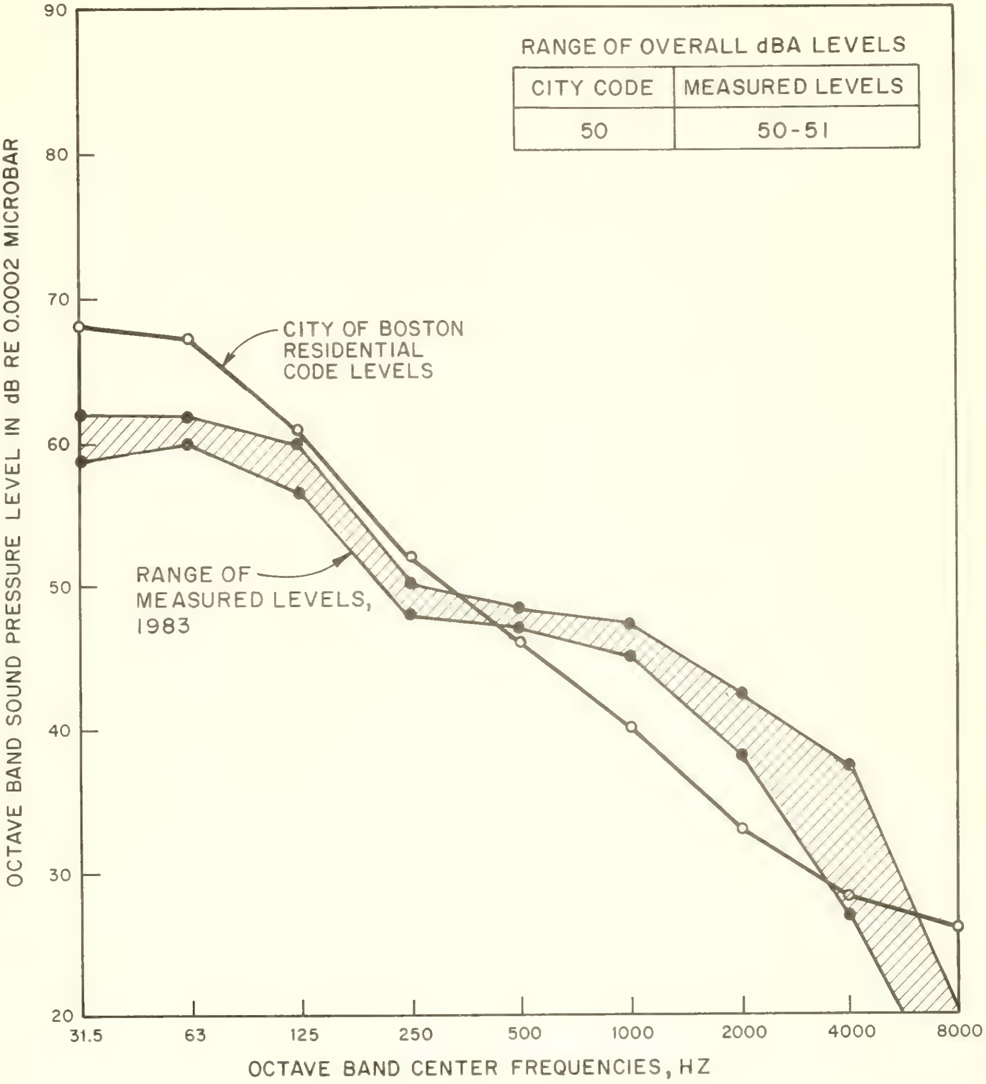


FIGURE 5.7-6

RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 4 (ZONE: RESIDENTIAL)

NEW BOSTON STATION UNITS I AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



RANGE OF OVERALL dBA LEVELS

CITY CODE	MEASURED LEVELS
50	50-51

FIGURE 5.7-7

RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 5 (ZONE: RESIDENTIAL)

NEW BOSTON STATION UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

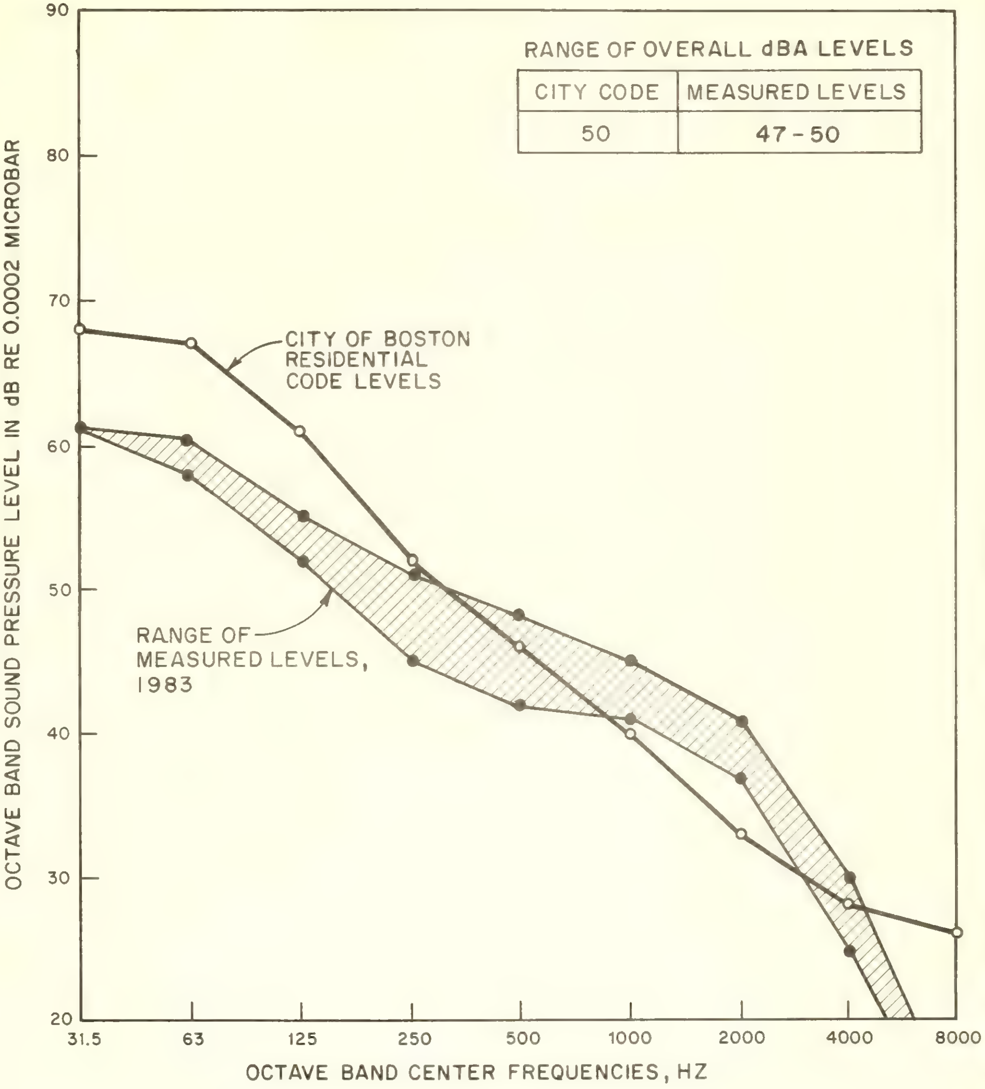
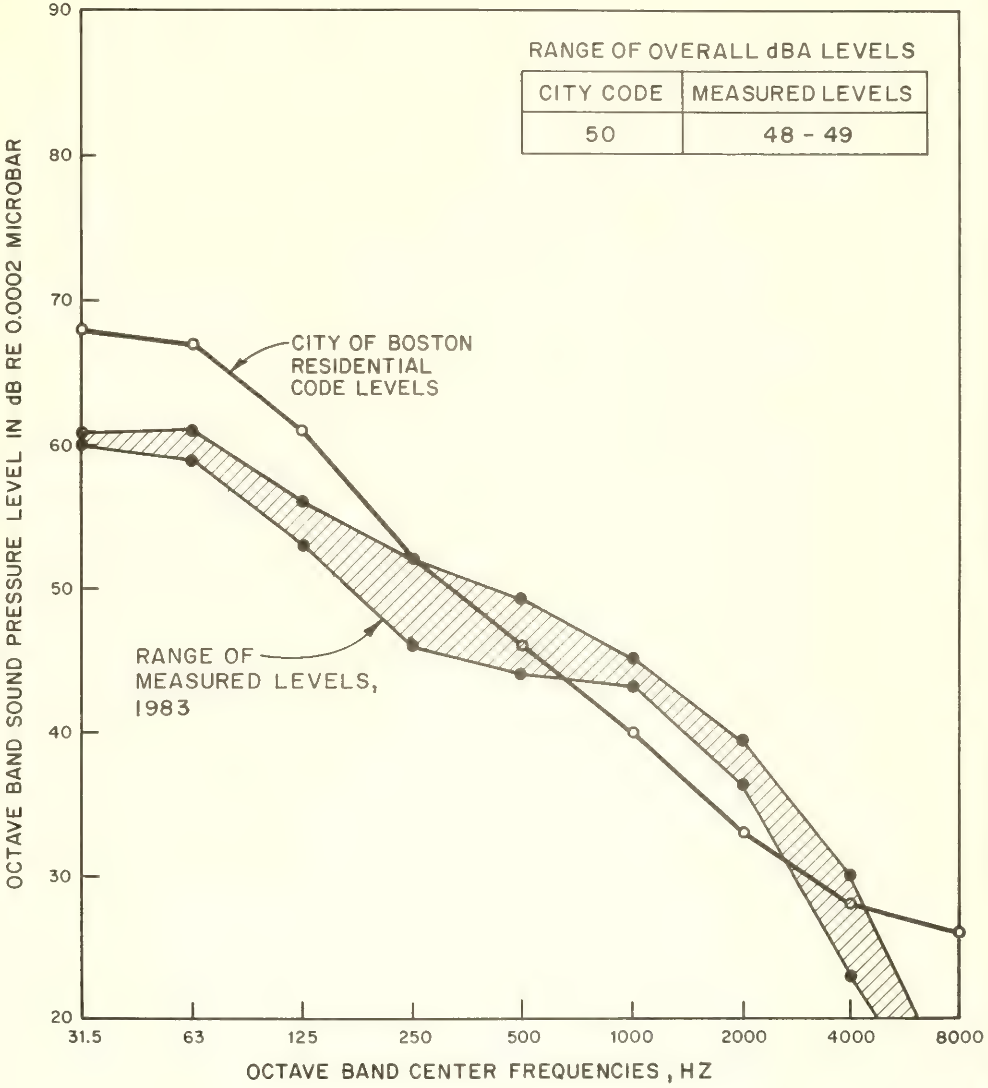


FIGURE 5.7-8
RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 6 (ZONE: RESIDENTIAL)
NEW BOSTON STATION UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



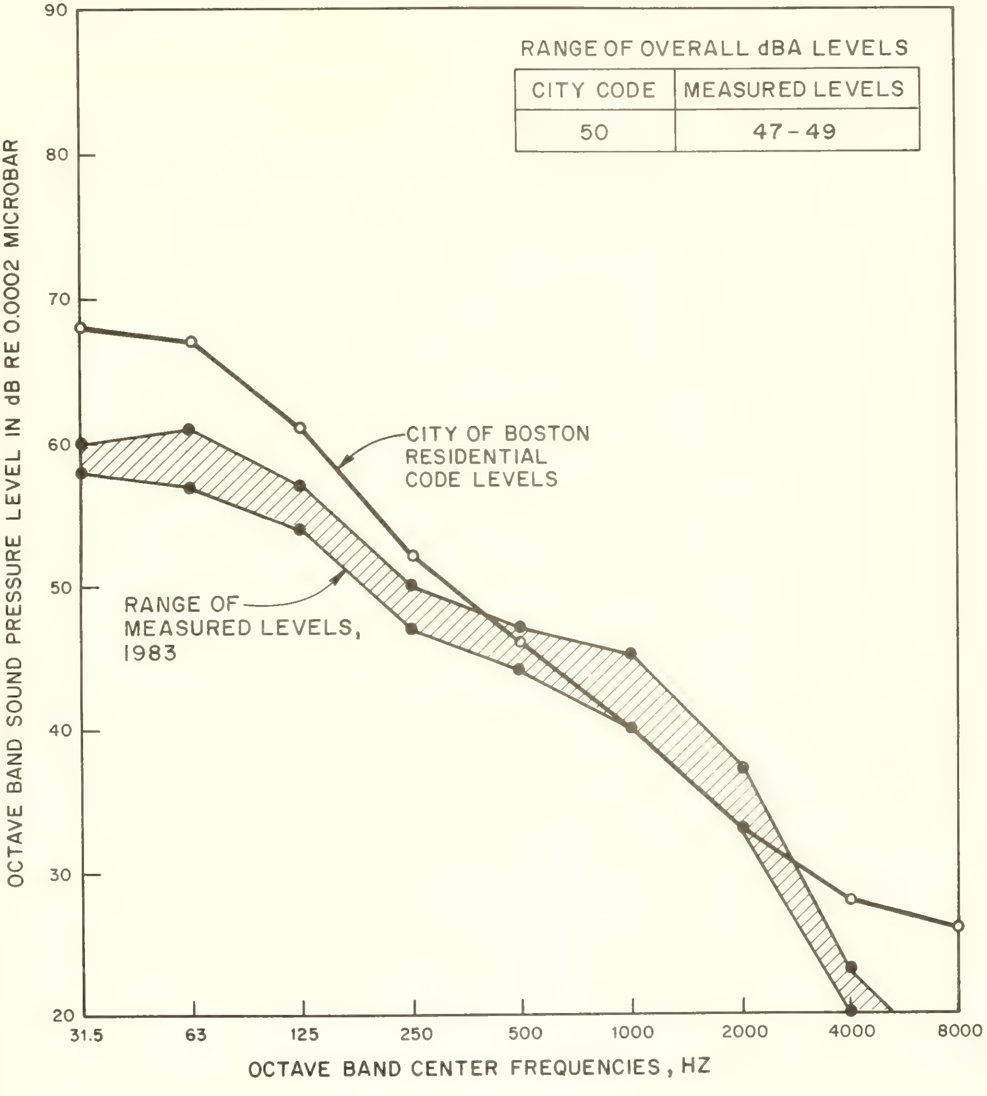
RANGE OF OVERALL dBA LEVELS

CITY CODE	MEASURED LEVELS
50	48 - 49

FIGURE 5.7-9

RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 7 (ZONE: RESIDENTIAL)

NEW BOSTON STATION UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



RANGE OF OVERALL dBA LEVELS

CITY CODE	MEASURED LEVELS
50	47 - 49

FIGURE 5.7-10

RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 8 (ZONE: RESIDENTIAL)

NEW BOSTON STATION UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

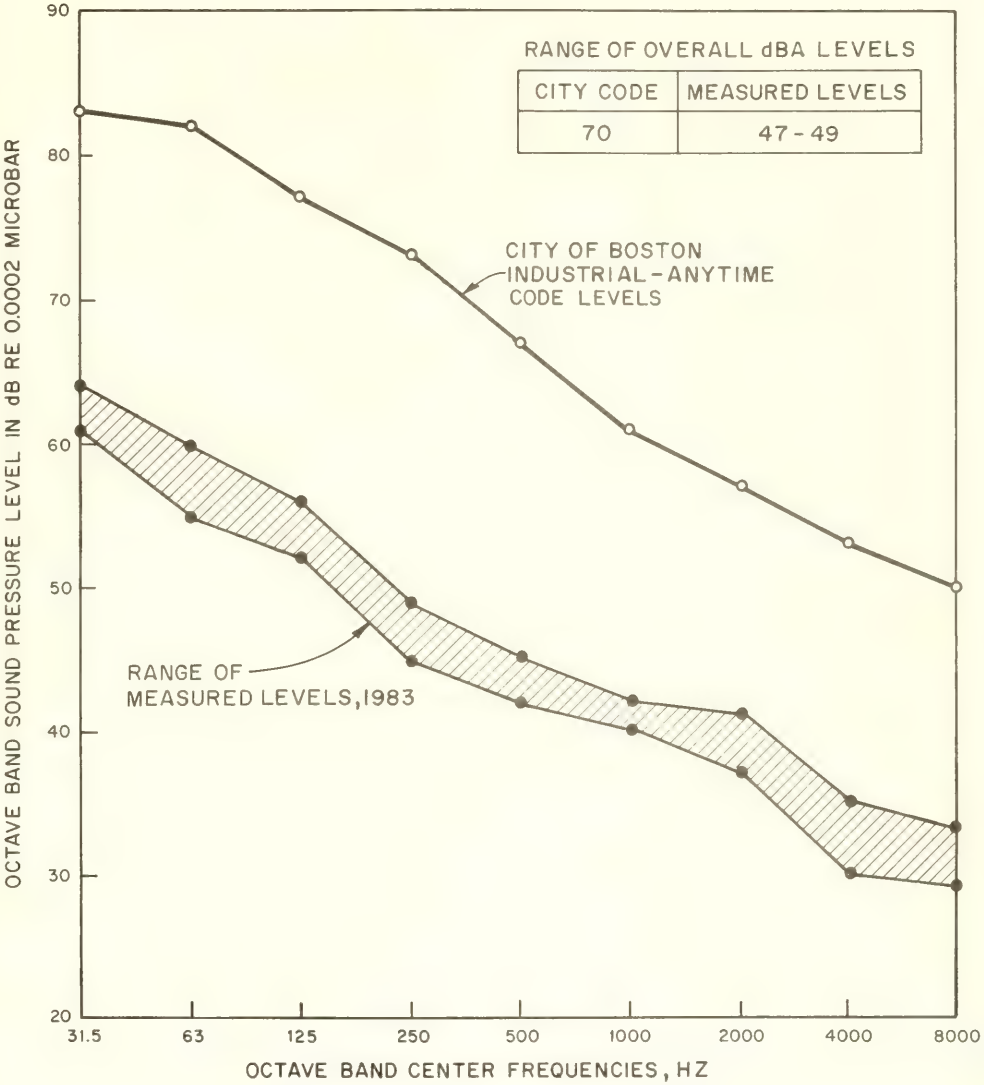


FIGURE 5.7–11

RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 9 (ZONE: INDUSTRIAL-ANYTIME)

NEW BOSTON STATION UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

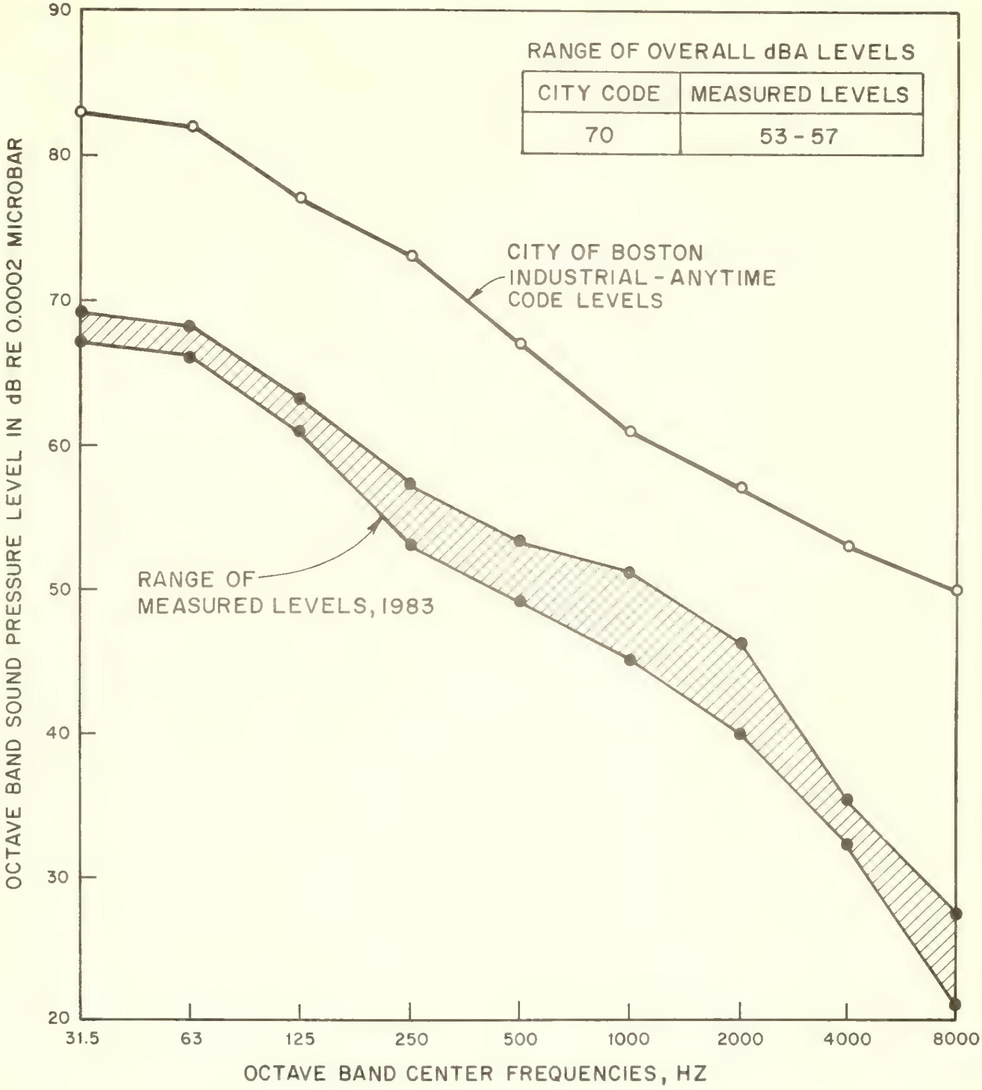
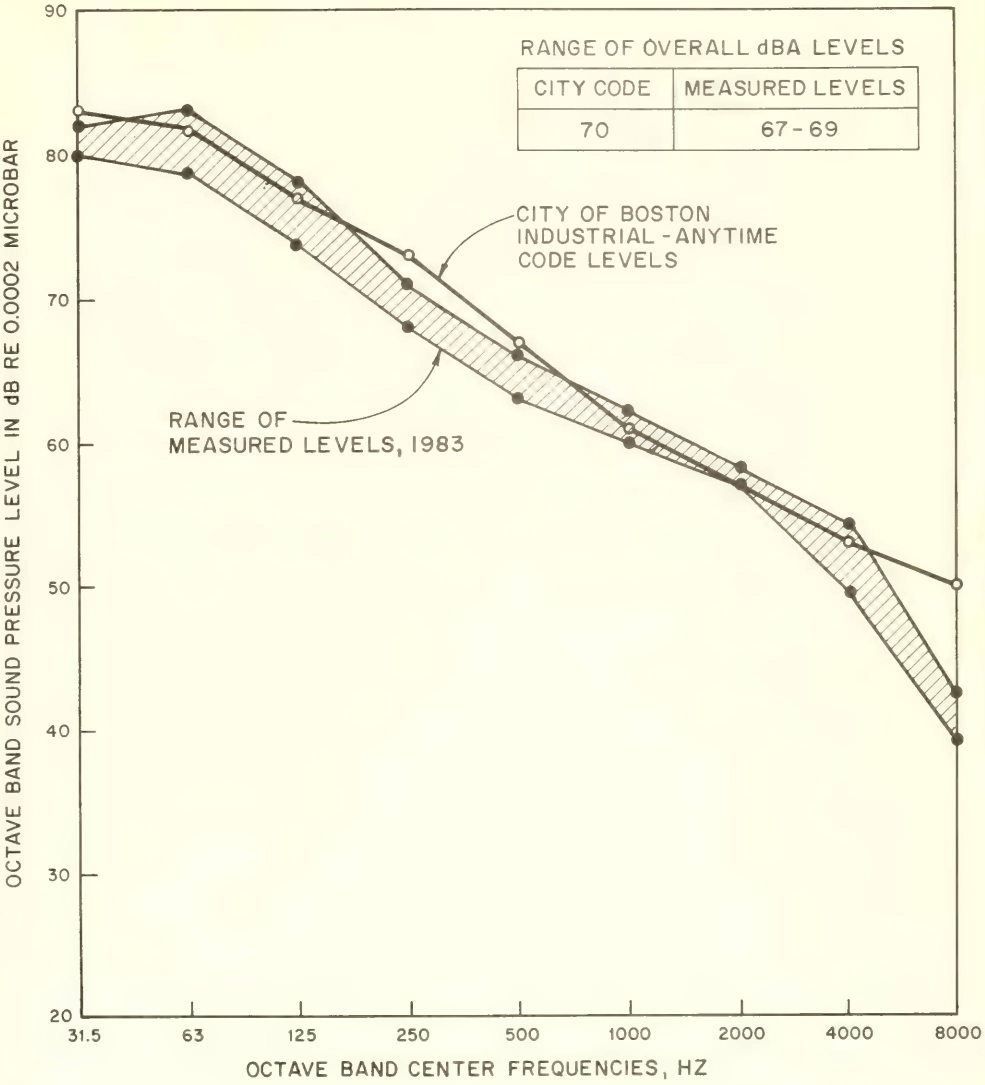


FIGURE 5.7-12

RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 10 (ZONE: INDUSTRIAL-ANYTIME)

NEW BOSTON STATION UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



RANGE OF OVERALL dBA LEVELS

CITY CODE	MEASURED LEVELS
70	67 - 69

FIGURE 5.7-13

RANGE OF NIGHTTIME OCTAVE BAND RESIDUAL SOUND PRESSURE LEVELS AT POSITION 11 (ZONE: INDUSTRIAL-ANYTIME)

NEW BOSTON STATION UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

5.8 GENERAL OVERVIEW OF ACID PRECIPITATION

5.8.1 Introduction

This section provides a summary of the major issues surrounding the acid precipitation phenomenon based on a comprehensive review of the latest available information. These issues include the following: the sources of acid precipitation, chemical transformations in the atmosphere, transport and deposition mechanisms, and terrestrial and aquatic effects. This section is not intended to provide a detailed discussion of the theories and research connected with these issues but to present an overall picture of the current state of knowledge concerning acid precipitation. This information will then be utilized in the discussion of potential local, regional, and national/international effects of the Mystic and New Boston emissions on precipitation acidity, aquatic ecology and terrestrial ecology in Sections 7.1.2.4, 7.3.2.4, and 7.4.2.4, respectively.

5.8.2 Acid Precipitation

Any form of precipitation which has a pH value less than 5.6 is commonly referred to as acid rain. Acid deposition refers to the settling to the earth's surface of dry particles with a comparable pH less than 5.6.

The pH is a numerical value used to describe the acidity of a liquid in terms of the concentration of hydrogen ions present. The pH, the negative logarithm of the hydrogen ion concentration, ranges from 0 to 14, with 0 indicating most acidic and 14 most basic. For example, on the pH value scale, lye is 13; soaps vary from 8-9; carrots are 5; pears 3.8; carbonated soft drinks 3; and lemon juice 2. Eight chemical substances which ionize in solution are commonly used in the measurement of the acidity of rain. Chemists measure the net balance between the positively charged ions (calcium, magnesium, ammonium, sodium, and potassium) and the negatively charged ions (sulfate, nitrate, and chloride), counted in microequivalents of hydrogen ions. A pH value of 7 indicates neutrality. Since the pH scale is logarithmic, a change of 1 pH unit represents a 10-fold change in the hydrogen ion concentration. The pH value of 5.6 ascribed to "pure" rain is that of distilled water in equilibrium with normal atmospheric concentrations of carbon dioxide, forming a weak solution of carbonic acid. It would be incorrect to assume that any contributing acids are still present in the rain, as such, or that lakes contain liquid acids. The use of pH 5.6 as the reference value of "pure" rain is controversial and is discussed in detail in the bibliography (see Section 5.8.9, items 1, 2, and 3.

The concern over acid rain in the Northeastern United States is based on the reported trend of increasing acidity. No long-term precipitation chemistry data from the same location using a single sampling method are currently available to validate such a trend. Inferred trends of precipitation acidity using existing historical precipitation data are varied and are discussed in detail in the bibliography (see Section 5.8.9, Items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 23). Despite the debate concerning pH trends, acid precipitation, by definition, that with a pH less than 5.6, is occurring at numerous locations in the United States, including the Northeastern States.

5.8.3 Sources

Acid rain in the United States is primarily due to the presence of sulfur and nitrogen compounds either directly emitted into the atmosphere from man-made sources or from natural sources which release hydrogen sulfide, sulfur dioxide, and sulfates from tidal flats, swampy areas, sea spray, and soils. Nitrogen oxides are produced naturally by the decomposition of nitrates and from lightning discharges. The amount of natural emissions is uncertain and is discussed in some detail in the bibliography (see Section 5.8.9, Items 1, 2, 11, 12, 13.). Of the man-made sources of acid rain precursors, fossil-fuel combustion is a major contributor of sulfur and nitrogen oxides. Fossil-fuel combustion contributes approximately 76 percent and 49 percent of the total man-made contributions of SOx and NOx, respectively. More detailed emission estimates are given in the bibliography (see Section 5.8.9, Items 1, 2, 4, 5, 9, 10, 14, 15, 17, 18, 19, 20).

5.8.4 Chemical Transformations

For the most part, the pH of precipitation is the result of chemical reactions in the atmosphere involving primarily the oxidation of sulfur and nitrogen oxides. The rate at which these reactions occur determines the pH of precipitation. The most relevent reactions in the formation of sulfates include the oxidation of hydrogen sulfide and sulfur dioxide which takes place by direct and indirect photo oxidation and by catalyzed and uncatalyzed oxidation in liquid water. The conversion of nitrogen oxides to nitrates takes place through a series of complicated reactions in which nitrogen oxides pass through various stages of oxidation. These chemical transformations can take place over a lengthy time period and thus can occur at significant distances downwind.

These chemical reactions are discussed in detail in the bibliography (see Section 5.8.9, Items 1, 2, 10, 21).

5.8.5 Transport and Deposition Mechanisms

The transport of acid rain precursors is governed by the physical atmospheric processes of advection and diffusion, which are dependent on wind speed and direction, atmospheric stability, and limits to vertical dispersion. Therefore, large-scale climatological features, such as prevailing winds, storm tracks, and the occurrence of stagnant conditions, determine the distribution of acid deposition. Deposition patterns are also determined by the location and intensity of rainfall, chemical transformation rates, and the location and strength of pollution sources.

Much of the United States is dominated by the jet stream, which is generally a prevailing west to east air flow. In the summer, flows from the south predominate over the Central States and flows from the southwest are common over the northeast. As a result, air pollution in the Central and Southern States is very often transported northeastward during the summer toward New England. In the winter, the northeast is dominated by northwest flows from Canada.

These general air flow patterns have been used by some investigators to explain the typically lower pH of some summer precipitation, which is coincident with higher sulfate levels. These flow patterns over the heavily industrialized Ohio Valley have been linked by some researchers with the higher acidity of New England precipitation in the summer. Other contributing factors include increased intensity of solar radiation which increases transformation rates and increased thunderstorm activity.

More detailed discussions of transport and deposition mechanisms are given in the bibliography (see Section 5.8.9, Items 1, 2, 4, 5, 9, 10, 15, 22, 24, 25, 26, 27).

5.8.6 Effects on Aquatic Ecology

In Europe and North America, acid precipitation has been linked to effects on freshwater lakes and streams. However, there is currently considerable debate about the direct cause-and-effect relationships between this precipitation and the lowering of surface water pH (See Section 5.8.9, Item 28).

The pH of surface water and its effect on aquatic ecology has been the subject of a great deal of recent research and many technical publications. A comprehensive review is beyond the scope of this report. However, for a thorough review, Haines (1981), and Bangay and Riordan (1983) may be consulted (see Section 5.8.9, Items 29 and 28). The following discussion is based on these references.

The pH of precipitation is variable and fluctuates within individual storms. In fresh water in the Northeastern United States, a downward fluctuation of pH is at times greater in the spring when the combination of spring rains and snow melt can cause a more rapid reduction in pH than commonly occurs at other seasons of the year.

An increase in acidity measured as a lower pH value in freshwater environments causes changes in the species composition and abundance of aquatic flora and fauna. Planktonic and periphytic algae and aquatic macrophytes are among the aquatic flora which appear to respond to pH decreases with changes in community structure.

A reduction in pH also produces changes in freshwater invertebrate populations, including zooplankton and benthic invertebrates, by causing a reduction in biomass, a simplification in community structure, and a change in species dominance with lowered pH.

Lowered pH of surface water also affects fish populations. The most common effect of lowered pH, which results in the decline or eventual elimination of fish populations, is the apparent interference with the reproductive mechanism, embryonic development, hatching, and larval development. Cases of acute fish mortality most likely result from a complex interaction of several physiological phenomena. Increased acidity may also produce long-term effects on the fish community. Some studies have found that the age structure of species populations changes, with a decline in the older, larger individuals noted.

Fish from highly acidic usually poorly buffered lakes have also been reported to contain elevated levels of some trace metals. This may be the result of increased availability of these materials at lower pH or as a result of greater concentrations in a simplified food chain. Availability of trace metals and other constituents in surface water is affected by pH. Fluctuations have been attributed to both direct addition from precipitation, changes in solubility (caused by lower pH), and associated leaching from sediments and soils.

While lowered pH appears to result in changes in freshwater aquatic ecosystems, little information exists on the effects on marine ecosystems. There is, however, little likelihood of impacts to marine life, because of the inherently high buffering capacity of seawater.

5.8.7 Effects on Terrestrial Ecology

One of the most comprehensive recent reviews of the effects of acid precipitation on the terrestrial environment was conducted by Bangay and Riordan (1983) as part of the Canadian-American Impact Assessment Work Group (see Section 5.8.9, Item 28). It is the intent of this section to provide a general overview of this complex and highly controversial issue with appropriate references to available literature.

The impacts of acid precipitation on terrestrial systems are difficult to quantify because of the complexity of the terrestrial environment (i.e., containing both living (biotic) and non-living (abiotic) components) and the nature of acid precipitation itself (i.e., a broad, regional, nonpoint source phenomenon which occurs in the form of dry deposition (particulates), wet deposition and/or fog) (see Section 5.8.9, Items 28, 30, 31).

Within the last decade, extensive research has been conducted on the effects of acid precipitation; however, quantification and isolation of the cause-and-effect relationships between acid precipitation and terrestrial impacts have not been definitively established because of confounding variables in the environment. Thus, because acid precipitation is but one of many variables, its effect may enhance, be enhanced by, mask or be masked by other variables or stresses (see Section 5.8.9, Items 28, 30, 32).

Simulated acid precipitation has been shown, through laboratory and controlled field studies, to have two modes of effect on terrestrial systems - direct and indirect. Direct effects of the lowered pH in simulated acid precipitation on vegetation include both beneficial and negative effects. Direct beneficial effects include short-term increases in growth and yield (see Section 5.8.9, Items 28, 33, 34, 35). Direct negative effects of increased acidity on vegetation include damage to protective surface structures of leaves and decreases in growth and yield through interference with normal metabolic processes such as photosynthesis and reproduction (see Section 5.8.9, Items 28, 36, 37, 38, 39). Studies have been conducted under a wide range of conditions and have employed a variety of naturally occurring species and agricultural crops (see Section 5.8.9, Items 36, 37, 40,41).

Indirect effects of acid precipitation on vegetation may include long-term changes in soil chemistry. Simulated acid rain has been shown to affect the availability of nitrogen in the soil, inhibit nitrogen-fixation by reducing the number of soil microorganisms, decrease soil respiration and increase leaching of nutrients such as calcium, potassium and magnesium from the soil (see Section 5.8.9, Items 28, 30, 42). It has also been suggested that low pH in the presence of heavy metals, especially aluminum, is also capable of damaging plants. Work by Vogelmann and Ulrich suggests that an acid rain/aluminum combination may be partially responsible at least for the decline of spruce forests in portions of Vermont and West Germany (see Section 5.8.9, Items 28, 43, 44,45).

5.8.8 Summary

In the United States, especially in the Northeast, the existence of acid rain, which by definition has a pH less than 5.6, has been well documented for approximately the past 10 years by precipitation chemistry networks. It is well known that the pH of precipitation in the Northeast falls generally in the 4 to 5 range. Much research has been conducted to determine the causes of these low pH values in precipitation and their effects on aquatic and terrestrial ecology. However, no definitive conclusions can be drawn in regard to these issues at this time due mainly to the lack of long-term field studies in the natural environment with which to verify the numerous theories of causes and effects.

5.8.9 Bibliography

1. Bubenick, D.V.; Record, F.A.; and Kindya, R.J. Acid Rain - An Overview of the Problem. Environmental Progress. Vol 2, No. 1. February 1983.

2. Oxley, J.H., Project Manager. Research Report to American Electric Power Service Corporation on Overview Section: Summary, Objectives, Conclusions, and Project Organization. Battelle Columbus Laboratories. Columbus, OH. September 1980.

3. Sequeira, R. Acid Rain: An Assessment Based on Acid-Base Considerations. Journal of the Air Pollution Control Association, Vol 32, No. 33. pp 241-245. March 1982.

4. Altshuller, A.P. and McBean, G.A. Second Report of the United States - Canada Research Consultation Group on the Long Range Transport of Air Pollutants, November 1980.

5. Bridge, J.E. and Fairchild, F.P. Northeast Damage Report of the Long Range Transport and Deposition of Air Pollutants. Prepared for the Northeast States for Coordinated Air Use Management of the New England Interstate Water Pollution Control Commission. April 1981.

6. Coffey, P.E.; Galvin, P.J.; Samson, P.J.; and Cline, J.A. Summer Aerosol Transport Study Report by New York State Department of Environmental Conservation. Albany, N.Y. 1977.

7. Oden, S. The Acidification of Air and Precipitation and Its Consequences on the Natural Environment. Ecol. Comm. Bull, No. 1, Sweden National Science Research Council, Stockholm 1968.

8. Stensland, G.J. and Semonin, R.G. Another Interpretation of the pH Trend in the United States. Bulletin of the American Meterological Society, Vol 63, No. 11. November 1982.

9. Szabo, M.F.; Esposito, M.P.; and Spaite, D.W. Acid Rain: Commentary on Controversial Issues and Observations on the Role of Fuel Burning. Prepared for the U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, West Virginia. Contract No. DE-AC21-81MC19170. March 1982.

10. United States Environmental Protection Agency, Office of Research and Development. Acid Rain, EPA-600/9-79-036. July 1980.

11. Galloway, J.N. and Whelpdale, D.M. An Atmospheric Sulfur Budget for Eastern North America. Atmospheric Environment, Vol 14, 1980.

12. Rasmussen, R.A. and Went, F.W. Volatile Organic Material of Plant Origin in the Atmosphere. Proceedings of the National Academy of Sciences, 53, pp 215-220. 1965.

13. Rasmussen, R.A. What Do the Hydrocarbons from Trees Contribute to Air Pollution. Journal of the Air Pollution Control Association, 22, pp 537-543. 1972.

14. Anath, K.P.; Galeski, J.B.; and Honea, F.I. Particle Emission Reactivity. U.S. EPA No. 600/2-76-257. Research Triangle Park. pp 79. 1976.

15. Chandler, M.W. Summary Report of the NCAQ Atmospheric Dispersion Modeling Panel, Volume 1. Prepared for the National Commission on Air Quality by Dames and Moore. 5-AQ-7379. 1980.

16. Hunt, W.F., Jr., ed. National Air Quality and Emissions Trends Report. 1977. U.S. EPA No. 450/2-78-052. Research Triangle Park, NC. 1978.

17. Land, G.W. The Changing Patterns of Fossil Fuel Emissions in the United States. H.M. Eghend and W.T. Beery, eds., Second International Clean Air Congress Proceedings. Academic Press. 1971.

18. Rivers, M.E. and Riegel, K.W. Work Group 3B - Emissions, Costs, and Engineering Assessment, Final Report. Report No. 3B Final. June 15, 1982.

19. United States Environmental Protection Agency, Office of Research and Development. Research Summary, Acid Rain. 1979.

20. United States Environmental Protection Agency, National Emissions Report in National Emissions Data System of the Aerometric and Emissions Reporting System. EPA-450/4-80-005. 1980.

21. Pena, R.G. Sulfur in the Atmosphere and its Role in Acid Rain. Earth and Mineral Sciences, Pennsylvania State University, College of Earth and Mineral Sciences, Vol 51, No. 6. July/August 1982.

22. Bass, A. Modeling Long Range Transport and Diffusion. Second Joint Conference on Applications of Air Pollution Meteorology. New Orleans, Louisiana. March 24-26, 1980.

23. Cogbill, C.V. and Likens, G.E. Acid Precipitation in the Northeastern United States. Water Resources Research. 10(6):1133-1137. 1974.

24. Lioy, P. et al. Evidence of High Atmospheric Concentrations Detected at Rural Sites in the Northeast. Journal of Environmental Science and Health, (192). 1977.

25. Miller, J.M., et al. Origin of Air Masses Producing Acid Precipitation at Ithaca, NY, A Preliminary Report. Geographical Research Letters, (5). 1978.

26. Venkatram, A.; Ley, B.E.; and Wong, S.Y. A Statistical Model to Estimate Long-Term Concentration of Pollutants Associated with Long Range Transport. Internal Report, Ontario Ministry of the Environment. 29 pp.

27. Vermuelen, A.J. The Acid Precipitation Phenomenon. A Study of this Phenomenon and of a Relationship Between the Acid Content of Precipitation and the Emission of Sulfur Dioxide and Nitrogen Oxides in the Netherlands. Polluted Rain, Proceedings of Twelfth Rochester International Conference on Enviromental Toxicity. May 21-23, 1979. Plenum Press Publishers, New York. 1980.

28. Bangay, G.E. and Riordan, C. Work Group I, Impact Assessment Final Report (Draft). January 1983. United States-Canada, Memorandum of Intent on Transboundary Air Pollution, 660 p. 1983.

29. Haines, T.A. Acidic Precipitation and its Consequences for Aquatic Ecosystems: A Review. Transactions of the American Fishery Society. 110:669-707. 1981.

30. Glass, N.R. Environmental Effects of Increased Coal Utilization: Ecological Effects of Gaseous Emissions from Coal Combustion. USEPA. Office of R&D, Corvallis. EPA-600/7-78-108. 49 p. 1978.

31. Hileman, Bette. 1982 Stockholm Conference on Acidification of the Environment. Environmental Science and Technology. 17(1):15A-18A. 1983.

32. Dvorak, A.J. et al. Impacts of Coal-Fired Power Plants on Fish, Wildlife, and Their Habitats. USDI. FWS/OBS-78/29. 261 p. 1978.

33. Bubenick, D.V.; Record, F.A.; and Kindya, R.J. Acid Rain - An Overview of the Problem. Environmental Progress 2(1):15-32. 1983.

34. Wood, T. and Bormann, F.H. Short-Term Effects of a Simulated Acid Rain Upon the Growth and Nutrient Relations of Pinus strobus. Water, Air, Soil Poll. 7:479-488. 1977.

35. Abrahamsen, G. and Dollard, G.J. Effects of Acid Deposition on Forest Vegetation In: Ecological Effects of Acid Precipitation (M.J. Wood, ed), Report of Workshop held at Calley Hotel Gatehouse-of-Fleet, Galloway, United Kingdom, September 4-7, 1978, EPRI SOA77-403, Report No. EA-79-6-LD, December 1979.

36. U.S. Environmental Protection Agency. Acid Rain EPA, Office of Research and Development. Washington, DC. July (EPA-600/9-79036). 36 p. 1980.

37. Abrahamsen, G.; Horntvedt, R.; and Tueite, B. Impacts of Acid Precipitation on Coniferous Forest Ecosystems. Water, Air, Soil Pollut. 8:57-73. 1977.

38. Jonsson B. and Sundberg, R. Has the Acidification by Atmospheric Pollution Caused a Growth Reduction in Swedish Forests? Rep. Notes No. 20, Royal College of Forestry. Stockholm, Sweden. 1972.

39. Glass, N.R. et al. Effects of Acid Precipitation. Environmental Science and Technology. 16(3). 162A-169A. 1982.

40. Lee, J.J.; Neely, E.; and Perrigan, S.C. Sulfuric Acid Rain Effects on Crop Yield and Foliar Injury. USEPA. Rept No. EPA-600/3-80-016. 1980.

41. Jacobson, J.S. The Influence of Rainfall Composition on the Yield and Quality of Agricultural Crops. In: Proc. Int. Conf. Ecol. Impact of Acid Deposition, eds. D. Drablos and A.

Toilan. p 41-46. SNSF - Project, Sandefjord, Norway. 1980. Johnson, A.H. Evidence of Acidification of Headwater Streams in the New Jersey Pinelands. Science 206(16):834-836. 1979.

42. Lee, J.J. and Weber, D.E., Effects of Sulfuric Acid Rain on Two Model Hardwood Forests. USEPA. Rept No. EPA-600/3-80-014. 1980.

43. Vogelmann, H.W. Catastrophe on Camels Hump. Natural History. 91(11):8-11. 1982.

44. Ember, L.R. Acid Rain Implicated in Forest Dieback. Chemical and Engineering News, November 22, 1982. p 25-26. 1982.

45. Hileman, Bette. Acid Fog. Environmental Science and Technology. 17(3):117A-120A. 1982.

SECTION 6

DESCRIPTION OF THE PROPOSED PROJECT

6.1 OBJECTIVES OF THE PROPOSED PROJECT

The major objective of both national and state energy plans is to reduce dependence on imported oil for electric generation. On a national level, reduced oil imports will improve the United States balance of payments, stabilize the price of energy, and provide protection against recurrences of supply interruptions.

Two notable federal laws enacted to encourage electric utilities to seek alternative energy sources besides oil were the Energy Supply and Environmental Coordination Act of 1974 (ESECA) and the Power Plant and Industrial Fuel Use Act of 1978. The conversion of New Boston Station Units 1 and 2 to coal-fired power generation is consistent with the purposes of both acts.

At the state level, the Massachusetts Department of Public Utilities (DPU) policy reflects the policies underlying the federal statutes. Consequently, the DPU requested that Boston Edison Company (BECO) file a preliminary energy supply plan, detailing plans for supplying future needs at reasonable cost and at reduced levels of oil dependence. In response to the DPU request and in accordance with the policies established by federal and state energy planning agencies, BECO filed "Impact 2000 - An Energy Plan To the Year 2000" (Impact 2000, 1982). BECO concurs with the DPU in that the current BECO oil dependency level of approximately 70 percent should be substantially reduced. Full implementation of the initiatives outlined in Impact 2000 has the potential to reduce BECO's current oil dependency of approximately 70 percent to about 12 percent by the year 1999.

The major thrust of BECO's effort to reduce oil dependency is through coal conversion projects at two of its generating stations. The coal conversion of New Boston Station Units 1 and 2 and Mystic Station Units 4, 5, and 6 is projected to produce consumer savings of approximately $2.9 billion by the year 2000, and a displacement of over 9 million barrels of oil annually, with New Boston Station Units 1 and 2 alone displacing approximately 7 million barrels of oil annually.

The use of foreign oil in New England as a major source of fuel to produce electricity has been a concern for nearly a decade. Despite the relative stability of world oil markets during 1982, efforts to reduce oil dependency continue to draw the attention of energy planners concerned about future price increases and the region's susceptibility to interruptions in oil supplies, such as the price increase and supply interruptions experienced in 1973 and 1979.

The objective of the proposed coal conversion project is consistent with these established federal and state energy planning policies. The conversion to coal would allow BECO the flexibility of using the most economical fuel (coal or oil) without being totally dependent on either in the event of a major disruption in supply or a change in fuel market conditions.

References

Impact 2000 - An Energy Plan Providing Initiative for Managing Production and Consumption Trends to the Year 2000. Boston Edison Company, Boston, MA. July 1, 1982.

6.2 CHARACTERISTICS OF THE PROPOSED PROJECT

The purpose of the proposed project is to convert New Boston Station Units 1 and 2 to the use of coal as the base fuel while maintaining the capability to burn oil. The maximum net generating capacity of New Boston Station Units 1 and 2 when firing coal will remain approximately 380 MW each, after the proposed coal conversion.

This section describes proposed activities, structures, and systems which are part of the coal conversion. A description of the existing site and facilities is provided in Sections 4.1 and 4.7. The proposed coal conversion project includes the following activities:

1. Demolition of existing structures in some areas to accommodate new precipitators, new induced draft (ID) fans, a new chimney, active and reserve coal storage, and new waterfront facilities.

2. Dredging and disposal of approximately 25,000 cubic yards of Reserved Channel bottom sediments to accommodate the berthing of coal delivery vessels.

3. Installation of new coal handling and storage facilities, including waterfront coal vessel berthing structures, coal receiving facilities, active coal handling equipment, three active coal storage silos, a 50-foot high grass covered and imperviously lined reserve coal pile and reserve coal handling equipment, station area coal handling equipment, fire protection and dust suppression/collection equipment, and an imperviously lined coal pile runoff collection system.

4. Installation of four new ID fans and four new electrostatic precipitators, two of each per unit.

5. Construction of a new 369-foot chimney.

6. Installation of a pressurized pneumatic fly ash handling system for the two units, a fly ash silo, and a traveling ash barge loader to handle both fly ash and bottom ash.

7. Changes to existing Unit 1 and Unit 2 boilers, including addition of new coal feeder, pulverizer, primary air fan and burner equipment, modern compartmented windbox equipment, and conversion from pressurized to balanced draft furnaces.

8. Installation of a new bottom ash drag-chain conveyor system for both units, and two bottom ash storage/dewatering bins.

9. Minor modifications to the existing wastewater treatment system to ensure that peak waste generation rates do not cause sump flooding and that larger sludge volumes can be processed.

10. Temporary use during the construction phase of nearby K Street property, owned by Boston Edison Company (BECO), for construction laydown and parking for approximately 550 vehicles.

11. Construction of a recreational fishing pier for general public use.

6.2.1 Site

Plot plans showing the postconversion New Boston Station site, the Massachusetts Bay Transportation Authority (MBTA) property located immediately east of the New Boston Station, and the nearby K-Street property are presented in Figures 6.2-1, 6.2-2, and 6.2-3, respectively. A description of new facilities required by the conversion is provided in Sections 6.2.2 through 6.2.9. This section includes a discussion of additional activities required to accommodate these new facilities.

The MBTA owns the property shown in Figure 6.2-2 where proposed facilities for coal delivery vessel mooring, coal receiving, coal handling, and reserve coal storage will be located. BECO is currently negotiating with the MBTA on the arrangement under which BECO can acquire the right to use this property. Alternatives to the use of this property which could be considered are the following: operation with further reductions in reserve coal storage capacity, operation without reserve coal storage (with oil as a reserve fuel), operation with offsite reserve coal storage, and/or operation with increased active coal storage. These alternatives are considered to be less attractive options.

6.2.1.1 Demolition Work

The proposed demolition work will include the demolition, relocation, and removal of structural items, mechanical and electrical equipment, ductwork, piping, and similar miscellaneous items in the areas shown. Foundations will be demolished only if necessary to accommodate the final arrangement of the proposed new equipment and structures.

The major structures that will be demolished are the machine shop, storeroom, welding shop, paint shop, and retired screen house. All walls of the machine shop, except the common wall shared with the frequency changer room, will be demolished. Within the machine shop, the chimney will be demolished to grade and a gas turbine generator and associated equipment will be relocated to the frequency changer room. The turbine inlet silencer and the generator cooling duct outlet which are presently located on the machine shop roof will be relocated to the frequency changer room roof. The foam equipment, located in the machine shop, will be relocated to the north end of the frequency changer building.

The four existing 250-foot high steel stacks will also be demolished. Among the miscellaneous structures that will be demolished are the retaining wall and the stairway located east of the storeroom, the concrete curb around the light fuel oil tank, the toilet area located north of the frequency changer room, and miscellaneous deactivated equipment on the roof of the retired L Street Station. The light fuel oil tank will be relocated to the area presently occupied by the toilet facility.

Except for the four existing 250-foot stacks and the deactivated equipment on the L Street Station roof, all the superstructures to be demolished are of brick construction with steel roof trusses. The demolition work includes the skylights and a light steel-framed structure at the roof level of the turbine rooms, the electric operating room, and the machine shop.

On the MBTA property, an abandoned wooden dock along the length of the waterfront will be removed. Additionally, an abandoned truck scale will be demolished and the two 8-inch fuel oil lines serving BECO's property will be abandoned. A new 8-inch fuel oil line will be installed to the south of the area proposed for coal storage. An overhead electrical distribution line also will be relocated.

All demolition work will be performed in accordance with the U.S. Environmental Protection Agency, Massachusetts Department of Environmental Quality Engineering, City of Boston, and Occupational Safety and Health Administration policies and regulations.

6.2.1.2 Construction Laydown and Parking

The proposed construction laydown and parking area owned by BECO is located adjacent to East First and K Streets, as shown in Figure 6.2-3. The area to be temporarily used for construction laydown and parking is approximately 8.6 acres and can accommodate the storage of construction materials and provide offstreet parking for the duration of the construction phase of the project. Vehicle access is provided by East First, K, L, and Summer Streets. The area is large enough to provide ample parking for the peak number of construction personnel vehicles, estimated to be about 550. Portions of this area are currently used for parking and storing dumpsters, while the remainder is vacant.

The construction parking and laydown areas will require some minor grading and possibly crushed stone or gravel to improve the surface. Debris will be removed from both areas and disposed in an appropriate manner.

6.2.2 Chimney

Flue gas from each unit will be exhausted from the boiler air preheater outlets through electrostatic precipitators to a single dual-flue chimney by two ID fans per unit. The proposed chimney will be located east of the boiler house as shown in Figure 6.2-1.

The chimney will be 369 feet tall with a top elevation of 380 feet National Geodetic Vertical Datum (NGVD). It will be of reinforced concrete construction with two 16.5-foot inside diameter steel flues. The chimney will be equipped with aircraft warning devices in accordance with Federal Aviation Administration requirements. Flue gas sampling ports will be provided in the flues to accommodate flue gas sampling equipment.

Flue gas parameters such as exit velocity, temperature, and volumetric flowrates are discussed in Dispersion Modeling, Section 7.1.2.2. Estimated emission rates and ambient air quality impacts of criteria and noncriteria pollutants, and operational period mitigation measures are discussed in Sections 7.1.2.1 and 11.2.3.2, respectively.

6.2.3 Electrostatic Precipitators and Draft System

The conversion of Units 1 and 2 from oil to coal will result in an increase in the amount of particulate matter (fly ash) in the flue gas leaving the boiler. Two electrostatic precipitators per unit will be installed to remove the fly ash from the flue gas.

The new precipitators will be located above retired turbine rooms No. 1 and 2, and the electrical operating room. Design conditions for the precipitators are 4.004×10^6 lb/hr of flue gas per unit at 320°F when burning coal with an estimated maximum ash content of 12 percent (90 percent of which is conservatively considered to be fly ash) and a minimum fuel heating value of 12,000 Btu/lb. Particulate matter emission will be reduced to 0.08 lb/MBtu (or 99.1 percent removal under design maximum conditions). Each precipitator installation will include a redundant electrical field, hopper heaters, hopper aeration system, and weather and noise enclosures around hoppers and transformer-rectifier sets. The new precipitators will also be designed to operate while the units are burning No. 6 fuel oil at full load. Figure 6.2-4 shows a preliminary air and flue gas system flow diagram.

Both units will be converted from pressurized to balanced draft units with the addition of either two 2-speed or two variable speed ID fans per unit. Each fan will be sized for 749,000 acfm at 320°F with a static pressure rise of 26.4 inches of water. The forced draft fans will be modified to reduce their static pressure rise as part of the balanced draft conversion.

The outlet ductwork from the boilers will be modified to accommodate the new precipitators, ID fans, and chimney.

The average expected auxiliary power required to operate New Boston Station's electrostatic precipitators at full load is estimated to be 2070 kVA per unit. Based on a gross generation of 390 MW, the precipitator consumes approximately 0.5 percent of the unit's gross generating capacity. Precipitator auxiliary power may actually be expected to vary from 0.3 percent to 0.6 percent of gross generation, depending on the ash constituents of the coal or oil being fired.

Industry experience has shown electrostatic precipitators to be very reliable. In order to increase the availability of the precipitators, they are designed with redundant electrical fields to prevent shutting a unit down should an electrical field fail. Evaluation of historic availability data from the North American Electric Reliability Council (NERC) for precipitator equipment of the approximate size and type proposed for New Boston Station shows that the total equivalent availability factor of the precipitators is 99.916 percent. The total equivalent availability factor includes the effects of forced outages and forced partial outages. A forced partial outage is defined as the occurrence of a component failure or other condition which requires that the load on the unit be reduced 2 percent or more immediately, or up to and including the next weekend. Maintenance and planned outages are not included in the availability calculations. It should be emphasized that a component failure in the precipitator equipment does not mean that the particulate emission limits will be exceeded. It does mean that plant operation will be adjusted, if necessary, to ensure that the particulate emission limits are not exceeded.

6.2.4 Fly Ash Handling System

The electrostatic precipitators proposed for the coal conversion will be designed to remove up to 272,000 tons of fly ash annually from the flue gas with an estimated quantity removed of 122,000 tons per year, assuming 9 percent ash in a 12,500 Btu/lb coal. The fly ash will be collected in the precipitator hoppers and transported dry by a pressurized pneumatic handling system. The fly ash handling system flow diagram is shown in Figure 6.2-5.

Ash drops by gravity from the precipitator hopper outlets to lock hoppers. After a specified interval of time, the lock hopper will be sealed and pressurized by blowers fitted with silencers at the intakes to mitigate noise emissions. The fly ash will be pneumatically conveyed, through piping, to a fly ash silo by the blowers. The fly ash silo, located west of wastewater holding basin No. 1 (see Figure 6.2-1), will have an exhaust vent fitted with a high efficiency bin-type bag filter to minimize fugitive dust emissions. When the station burns oil, the fly ash will be transported pneumatically to the boiler, rather than to the fly ash silo, for reinjection into the furnace.

From the fly ash silo, the fly ash will be loaded into either trucks or barges for transportation to a purchaser or to an approved offsite disposal area. For dry truck transport usually to a purchaser, fly ash will fall by gravity through one of two truck loading spouts into enclosed tank trucks located below. The air displaced from the tank truck will be filtered before being exhaust to control fugitive dust emissions. For covered truck transport, usually to a waste disposal site, fly ash will fall by gravity into one of two dustless unloaders which will condition the fly ash with water before it falls into open ash trucks located below.

For barge transport, fly ash from the storage silo will drop by gravity into one of two dustless unloaders which will condition the fly ash with water before it falls onto a covered conveyor belt. The conveyor belt will feed a traveling ash loader to be located on an existing dock adjacent to BECO's circulating water discharge channel in the waterfront area. The traveling ash loader will convey the conditioned fly ash to an ash barge moored in the BECO discharge channel, entirely within the U.S. Pierhead and Bulkhead limits.

Although water will be provided to the dustless unloader, wastewater will not be generated by either the dustless unloaders or the dry fly ash handling system. Any runoff or drainage from the truck loading area will be directed to sumps and conveyed to the basins in the wastewater treatment system.

6.2.5 Boiler Changes

Equipment changes are planned for New Boston Station Units 1 and 2 boilers to realize reliable and efficient energy recovery from the combustion of coal. The existing burners and windbox will be replaced with new coal/oil burners and compartmented windbox. New spiral-wound furnace circuitry will be installed to evenly and more efficiently absorb heat into the furnace walls. Other changes for each unit's furnace will include a new furnace arch to improve the gas distribution over the superheater elements and new furnace platens which will depress gas temperatures entering the superheater. Changes to the convection pass circuitry (including economizer and reheater) will be made to reduce flue gas velocities. Additional soot blowers and changes beneath each furnace to provide for the bottom ash collection and handling system will be required to accommodate coal firing.

New gravimetric coal feeders and pulverizers, primary air fans, and controls will also be provided as part of the coal conversion and will be located within the existing boiler house enclosure.

6.2.6 Bottom Ash Handling System

Approximately 20 percent of the ash generated as a result of the combustion of coal, or about 30,000 tons per year, will be in the form of bottom ash. As part of the coal conversion effort, a new bottom ash drag-chain conveyor system is proposed. The bottom ash drag-chain conveyor system, shown in Figure 6.2-6, will transport and store bottom ash and economizer ash generated by the boilers of Units 1 and 2. The ash will be collected on a water-impounded drag-chain conveyor underneath the boiler and continuously removed by the drag-chain conveyor which travels horizontally the length of the boiler. As the chain conveyor clears the boiler, it will incline up at a fixed angle, so that the bottom ash will dewater by gravity. The economizer ash will be collected on a horizontal dry drag-chain conveyor below the economizer ash hoppers. This drag chain conveyor will transport the ash to a water-impounded tank which will periodically empty by gravity into the water-impounded drag chain conveyor.

From the discharge of the primary drag-chain, the bottom ash will pass through a clinker grinder where any large clinkers will be crushed and then to a secondary water-impounded drag chain conveyor to cool any crushed clinkers having molten interiors. After dewatering on the secondary drag chain incline, the ash will be fed via a redundant belt conveyor system to one of the two storage/dewatering bins, located southwest of oil tank No. 2 (see Figure 6.2-1).

Dewatered bottom ash containing about 15 percent water by weight will be discharged by gravity from each storage/dewatering bin either through a truck loading chute to an open truck below the bin or onto a belt conveyor to a transfer house in the dock area, adjacent to the station circulating water discharge channel. From the transfer house, the bottom ash will be conveyed to a traveling loader which will feed a docked barge for transport to an offsite disposal area.

Makeup water will be added to the drag chain conveyor impoundment. A recirculation system with a heat exchanger will cool the primary impoundment water. With this recirculation system, blowdown from the impoundment will not be required, and no wastewater will normally be generated. Additional drainage from the storage/dewatering bin will be collected in a sump and pumped back to the primary drag-chain impoundment.

6.2.7 Coal Receiving, Handling, and Storage Facilities

The proposed coal conversion of Units 1 and 2 will include a system for receiving, handling, and storing coal (see Figure 6.2-7). Coal will be delivered to the New Boston Station site by ocean-going, self-unloading coal vessels with a maximum capacity of 35,000 tons and a maximum unloading rate of 4000 tons per hour (tph). As part of the proposed coal conversion a waterfront berthing facility, coal receiving equipment, and active and reserve coal storage and handling facilities are proposed.

A further discussion of the active and reserve pile coal handling is presented in Section 6.2.7.3. A flow diagram for the proposed coal-handling system is presented in Figure 6.2-7. A discussion of how coal spillage is prevented is provided in Section 11.2.1.1.

6.2.7.1 Waterfront Berthing Facility

The waterfront coal vessel berthing facilities are pile-supported structures of open-pier construction consisting of a coal surge bin enclosure and support platform, waterfront conveyors, and a system of breasting and mooring dolphins interconnected by catwalks. The facilities are designed and arranged such that a self-unloading vessel, boom forward or boom aft, is able to berth with either bow or stern towards the Summer Street Bridge. All waterfront structures are located within existing BECO and MBTA property lines, and the U.S. Pierhead and Bulkhead line. The arrangement and location of the waterfront facilities are shown in Figures 6.2-1 and 6.2-2.

6.2.7.2 Berthing Basin Construction

The intended berthing area at New Boston Station needs to be dredged to accommodate the largest expected coal delivery vessel. The soundings within the limits of the Reserved Channel, adjacent to the proposed berthing area, generally indicate a depth of at least 35 feet below mean low water, which is adequate to accommodate the fully loaded coal vessel. Existing depths shoreside of the Reserved Channel limit are for the most part too shallow for the coal vessel, thus necessitating dredging in the berthing area.

The extent of the proposed dredging by BECO is approximately an 800-foot long by 130-foot to 90-foot wide area, as illustrated on Figure 7.3-1. In the area where the delivery vessel will be moored, dredging will be done to a depth of 35 feet below mean low water. Dredging to varying depths of less than 35 feet will be required shoreward of this area to ensure stable side slopes of the berthing basin. Approximately 25,000 cubic yards of material will be dredged from within the limits shown. A discussion of the characteristics of the dredged material and the disposal plan is provided in Section 8.1.3. Further description of the dredging operation is provided in Section 7.3.1.4.

6.2.7.3 Active Coal Receiving, Handling, and Storage

The proposed active coal storage and handling facilities are designed to accommodate 150 percent of the coal delivery vessel's capacity. The active storage and handling facilities consist of a coal surge bin, waterfront transfer house, conveyors, active storage silos, silo transfer house, transfer-crusher house, intermediate transfer house, station transfer house, coal bunkers, and miscellaneous support equipment.

Coal arriving in the self-unloading vessel will be transferred via the ship's covered unloading boom conveyor to a 100-ton capacity enclosed surge bin and then to either of two waterfront conveyors. The surge bin enclosure will provide both weather protection and control of noise and fugitive dust emissions. The two 72-inch enclosed waterfront conveyors will transfer coal to the waterfront transfer and sampling house. Each conveyor will be rated at 4000 tph which provides 100 percent redundancy. Within the waterfront transfer and sampling house, an as-received coal sample will be taken and the coal will normally be transferred to a 72-inch enclosed silo stockout conveyor, rated at 4000 tph. At the top of the silos, a 4000 tph enclosed conveyor system will distribute the coal to the active coal storage silos.

Three 85-foot diameter by 185-foot high reinforced concrete active coal storage silos will be provided, each with a capacity of 17,500 tons. The total active silo storage is 52,500 tons, or 1.5 times the vessel capacity. This margin will provide flexibility in scheduling coal deliveries to avoid working the reserve coal storage pile. A continuous silo ventilation system equipped with fabric filter dust collection equipment will be provided.

Coal will be removed from beneath the silos with a rotary plow feeder which will feed the coal onto a 48-inch indoor silo reclaim belt conveyor, rated at 1600 tph with a half-speed rating of 800 tph. This conveyor feeds coal to the silo transfer house at the east end of the silos. A covered 48-inch silo emergency reclaim conveyor (1600 tph) will be provided from the silo transfer house to the waterfront surge bin. Should a hot spot develop within the silos, the silo reclaim conveyors would transfer coal to the silo emergency reclaim conveyor via the silo transfer house. Utilizing the emergency reclaim conveyor, the coal would be recycled back to the silos or routed to the reserve storage area for cooling, depending on the condition of the coal. Each coal transfer point is provided with a dust collection system. Fire detection and fire protection deluge systems are also provided for each conveyor.

Two enclosed 36-inch reclaim conveyors, each rated at 800 tph, will transfer coal from the silo transfer house to the coal transfer-crusher house. The crushed coal will then be transferred via two additional transfer houses to the tripper conveyors which will distribute the coal into Unit 1 and Unit 2 coal bunkers. As-fired coal samples will be taken in the transfer house at the tripper gallery.

6.2.7.4 Reserve Coal Storage/Handling

Reserve coal storage will be provided at the station by a grass-covered pile, containing approximately 244,000 tons. The proposed reserve coal storage pile is capable of providing an additional 53 days of storage (based on 70 percent capacity factor) in the event of a disruption in coal deliveries. The reserve coal handling facilities consist of a radial stacker, reclaim hoppers, and conveyors, including fugitive dust control, fire protective equipment, and coal pile runoff collection and storage facilities.

Coal will be stocked out to the reserve storage pile by use of a 72-inch enclosed belt conveyor, rated at 4000 tph, feeding a radial stacker equipped with a telescoping chute and dust collector. Coal deposited by the radial stacker will be distributed and compacted into the reserve coal pile by coaldozers to a height of approximately 50 feet.

Emergency reclaim from the reserve coal pile will be provided by three reclaim hoppers located adjacent to the north side of the reserve pile. The hoppers will feed a 36-inch emergency reclaim belt conveyor, rated at 800 tph. This conveyor will feed the silo transfer house from which the coal will be delivered to the plant via the normal reclaim system. Two coaldozers will be used to move coal from the reserve pile to the reclaim hoppers, starting at the north end of the pile. Due to the large active coal storage silo capacity, use of the reserve coal storage pile is expected to be infrequent. However, reserve pile operations will be restricted to daytime hours to mitigate noise emissions at night and comply with City of Boston noise codes. Noise mitigation measures are detailed in Section 11.2.1.2.

To improve the visual appearance of the completed pile, it will be covered with grass seed, fertilizer, and straw mulch, and then bound with an asphalt emulsion. The grass cover will also control the emission of fugitive dust from the pile. The visual appearance of the reserve storage pile is depicted in Section 7.6. Also discussed in Section 7.6 are alternative methods for reserve coal storage which were evaluated and rejected. Further information on the grass cover is presented in Section 11.2.6.

The coal pile runoff collection and storage facilities will be sized to collect and contain all the incident precipitation (5 inches) from the 10-year, 24-hour storm event. A coal pile liner is provided to prevent coal pile runoff from infiltrating the underlying soils and subsequently percolating into the Reserved Channel. The coal pile liner will consist of a layer of polymer-treated bentonite (volcanic clay) mixed with silty soils and compacted to a thickness of approximately 6 inches. An underdrain system, consisting of a 1-foot-thick layer of compacted sand and gravel and embedded perforated PVC piping, will drain coal pile runoff water accumulated on the top of the liner. Coal pile runoff will be collected within the coal storage area and will flow by gravity through an asphalt-lined trench to one of four imperviously-lined retention basins located at intervals around the coal pile. The basins will allow for the storage of approximately 750,000 gallons of runoff and a solids accumulation of up to 1 foot. The collection basins will include emergency discharge structures to ensure the integrity of the basins during excessively stormy weather conditions. Coal pile runoff will be pumped at a controlled rate to the existing wastewater treatment system.

During emergency utilization of the reserve coal storage system, fugitive dust emissions will be minimized by the use of the telescoping chute on the radial stacker, enclosed conveyors, dust collection at transfer points, portable water tank and spray nozzles for wetting of worked areas, etc. The grass covering on the coal pile will control wind erosion of undisturbed areas. A detailed discussion of fugitive dust emission mitigation measures is provided in Section 11.2.1.3.

A fire loop with attached hydrants and spray towers surrounding the reserve pile will provide fire protection in addition to grass watering. Conveyor fire detection and protection systems will also be provided. Fire protection is discussed in Section 11.2.1.4.

6.2.8 Wastewater Treatment and Disposal System

The existing New Boston Station wastewater treatment system will be utilized to treat station wastewaters (excepting sanitary wastewaters, cooling waters, and boiler condensate) in the postconversion period. Sanitary wastewater, cooling waters, and boiler condensate will continue to be managed as discussed in Section 4.7. A flowchart of the wastewater treatment system is presented in Figure 6.2-8. This system is further described in Section 4.7.5. Only minor modifications are required, as discussed below, to handle postconversion wastewater. The wastewater treatment system is capable of treating wastewaters with volumes, flows, and worst-case qualities as listed in Table 6.2-1.

The addition of coal pile runoff to existing station wastewaters results in a significant short term contribution to overall wastewater flows. This additional flow is handled by the use of a coal pile runoff collection system, which provides for equalization of coal pile runoff flows to the wastewater treatment system. This allows for continued operation of the 600 gallon per minute (gpm) design capacity wastewater treatment system below its design capacity on the long-term basis. Long-term discharge rates are discussed in Section 7.3.2.

All postconversion period station wastewaters, except chemical cleaning wastewaters and demineralizer regeneration wastewaters, will flow directly to the combined waste collection sump. The combined waste collection sump pump capacity will be increased to handle higher flowrates in the postconversion period. Chemical cleaning wastewaters will be routed directly to holding basin No. 1. Demineralizer regeneration wastewater will flow through a surge tank to take advantage of self-neutralization by combining acidic and caustic wastewater prior to discharge to the combined waste collection sump. Station wastewater will then usually be routed to either holding basin No. 2 or the aeration/mixing well. The 1.3 million gallon total capacity of the holding basins will provide the capacity for equalization of wastewater qualities and flow rates prior to discharge to the downstream treatment operations and processes.

All station wastewater will then receive aeration and mixing with lime or caustic to elevate the pH to approximately 9.5. Aeration of the wastewater is provided to oxidize trace metal ion concentrations (e.g., Fe^{++}) to the less soluble oxidation states (e.g., Fe^{+++}). At the adjusted pH, dissolved metals will precipitate as metallic hydroxides. Coagulant aide and coagulant are added to remove the metallic hydroxides and other suspended matter from the wastewater as a rapidly settling floc, which will settle out in the clarifier/thickener. The thickener will concentrate the solids into a sludge, which will then be removed for dewatering and eventual offsite disposal, as discussed in Section 8.2.4. Additional sludge dewatering equipment will be added to the existing wastewater treatment system to accommodate greater solids loading to the wastewater treatment system in the postconversion period. Oil and grease will be recovered from the clarifier/thickener water surface and stored in a holding tank. Recovered oil is disposed of offsite by a contracted disposal firm. The clarified effluent will then flow to a 1.5 million gallon polishing pond, providing 40 hours of detention time which provides additional removal of any settleable solids from the wastewater. Treated effluent then will be continually monitored and subject to automatic sulfuric acid addition, as necessary to reduce the pH to within 6 to 9 prior to submerged discharge to the Reserved Channel, where it will rapidly mix with the circulating water discharge.

Existing wastewater treatment system effluent limits are listed in Section 3.1. The modified wastewater system effluent qualities are likely to vary with time and with wastewater treatment system operation. It is anticipated that the highest concentrations of pollutants in the treated effluent will not exceed those listed in Table 6.2-2, which represents anticipated New Boston Station National Pollutant Discharge Elimination System (NPDES) limits. Reuse of treated effluent for makeup to the bottom ash handling system, ash truck washing system, and fly ash unloading dust suppression system will be incorporated into the final system designs where technically feasible.

6.2.9 Solid Waste Management Plan

Solid waste management is divided into two phases, the construction period plan and the operational period plan. The complete plan is presented in Section 8, Solid Waste Management Plan, with the construction period covered in Section 8.1 and the operational period covered in Section 8.2.

The construction period plan consists of the disposal of demolition and construction wastes in approved licensed landfills. Dredged materials will be disposed of in the Massachusetts Bay Foul Area, a designated ocean disposal site.

The operational period plan consists of a coal ash management plan along with ash use options and wastewater treatment sludge and general refuse disposal. The coal ash management program for New Boston Station will provide sound management practices for the 152,000 tons of fly ash and bottom ash generated each year. About 80 percent of the total will be fly ash and the remaining 20 percent bottom ash.

BECO plans to maximize ash reuse in conjunction with the development of a dedicated coal ash storage/disposal site. Dumping rights in a commercial sanitary landfill might also be reserved, should a dedicated disposal site not be available as early as necessary.

The disposal of wastewater sludge and general refuse would be made at appropriately licensed landfills.

TABLE 6.2-1

POSTCONVERSION PERIOD WASTEWATER VOLUMES, FLOWS AND DESIGN WORST-CASE QUALITIES

Boiler chemical cleaning wastes

Volume per cleaning = 400,000 gallons/boiler
Frequency = 1/3 yr/unit
Worst-case waste quality:

Constituent	Design Concentration (ppm)
Cu	2
Fe	9,800
Ni	5
Zn	8
TSS	200
pH	3.1 (std units)

Air preheater wash water (low pressure system)

Volume per wash = 420,000 gallons/unit
Frequency = 2/yr/unit
Worst-case waste quality:

Constituent	Design Concentration (ppm)
pH	2.2 (std units)
TSS	5,120
Fe	4,200
Cu	40
Zn	1.5
Ni	35

Air preheater wash water (high pressure system)

Volume per wash = 288,000 gallons/unit
Frequency = 2/yr/unit
Worst-case waste quality:

Constituent	Design Concentration (ppm)
pH	2.2 (std units)
TSS	5,120
Fe	4,200
Cu	40
Zn	1.5
Ni	35

TABLE 6.2-1 (Cont)

Floor and equipment drainage

Max flow rate = 504,000 gallons/day
Avg flow rate = 360,000 gallons/day
Design flow rate = 408,000 gallons/day
Worst-case waste quality:

Constituent	Design Concentration (ppm)
pH	3-12 (std units)
TSS	350
Oil and grease	2,100
Fe	14
Cu	0.7

Condenser chemical cleaning

Volume per wash = 40,000 gallons/wash
Frequency = 2/yr/unit
Worst-case waste quality:

Constituent	Design Concentration (ppm)
Cu	2
Fe	9,800
Ni	5
Zn	8
TSS	200
pH	3.1 (std units)

Demineralizer regeneration wastes

Maximum flow rate = 170,000 gallons/day
Frequency = 1/day
Worst-case waste quality:

Constituent	Design Concentration (ppm)
pH	2-12 (std units)
Fe	8

Boiler condensate

Maximum flow rate = 43,000 gallons/day
Frequency = 5/yr/unit
Worst-case waste quality:

Constituent	Design Concentration (ppm)
pH	11.5 (std units)
TSS	<10

TABLE 6.2-1 (Cont)

Boiler and economizer fireside cleaning wastes

Max flow rate = 500,000 gallons/day
Frequency = 5/yr/unit
Worst-case waste quality:

Constituent	Design Concentration (ppm)
TSS	600
Fe	14,000
Mn	40
Cu	250
Zn	40
Al	21
Ni	900

Carbon filter backwash wastes

Max flow rate = 13,200 gallons/day
Frequency = 2/day
Worst-case waste quality:

Constituent	Design Concentration (ppm)
pH	3-12 (std units)
TSS	10,000

Ash truck wash water

Max flow rate = 24,200 gallons/day
Frequency = 34/day
Worst-case waste quality:

Constituent	Design Concentration (ppm)
pH	2.9 (std units)
TSS	10,000
Fe	200

Bottom ash system drainage

Volume/event = 10,000 gallons/event
Frequency = 5/yr/unit
Worst-case waste quality:

Constituent	Design Concentration (ppm)
pH	4.7 (std units)
TSS	52
Cu	110
Fe	5.6
Ni	0.07

TABLE 6.2-1 (Cont)

Coal pile runoff

Volume = 682,000 gallons/day from 1/10-yr, 24-hr storm event

Maximum flow rate to wastewater treatment system = 150 gallons/minute

Worst-case waste quality:

Constituent	Design Concentration (ppm)
pH	2.3 (std units)
TSS	2,300
Fe	1,800
Cu	1.4
Zn	16
Ni	4.5

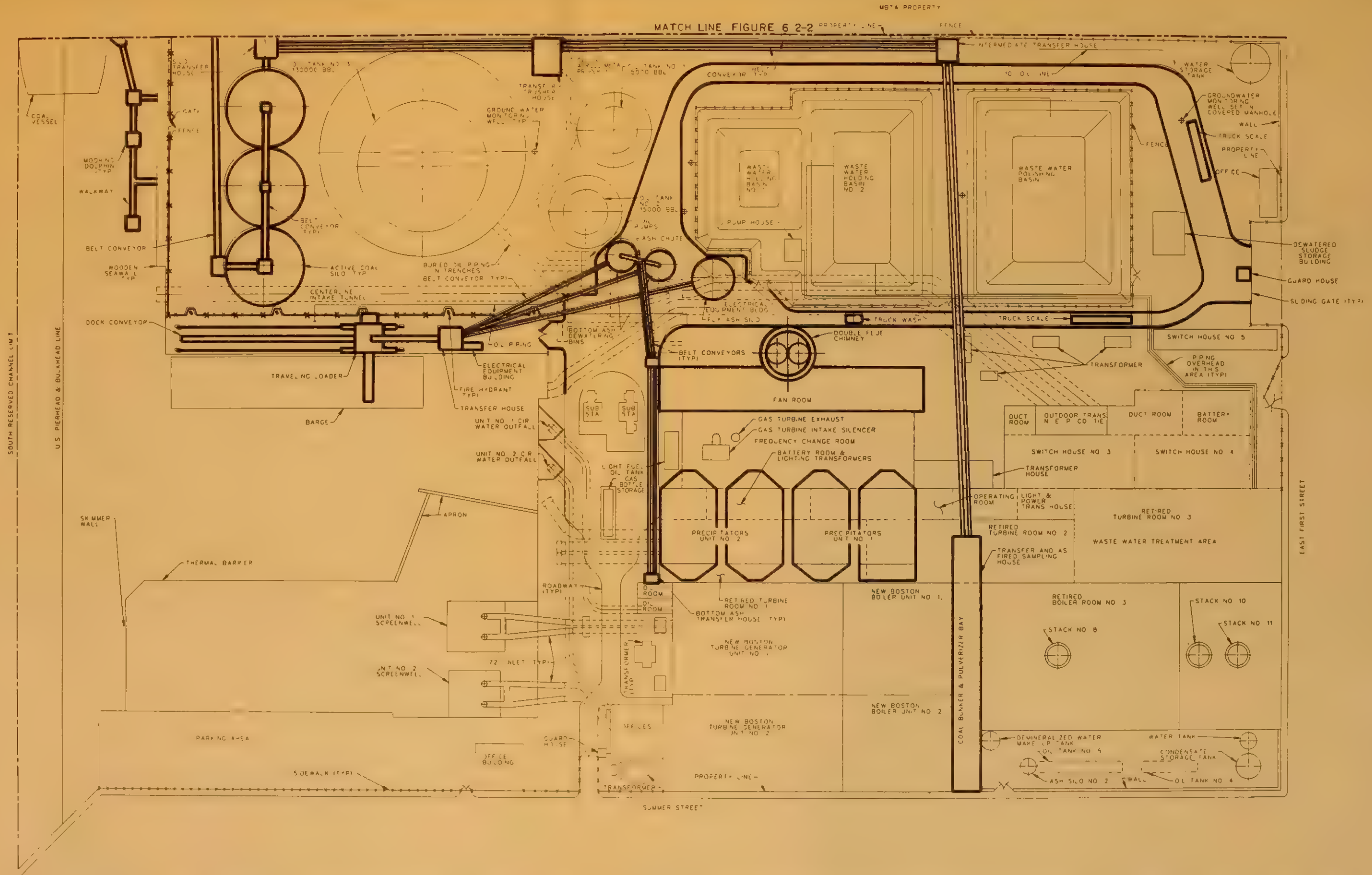
TABLE 6.2-2

MAXIMUM CONCENTRATIONS FOR POLLUTANTS IN THE NEW BOSTON STATION'S POSTCONVERSION WASTEWATER TREATMENT SYSTEM EFFLUENT

Constituent	Average Daily Discharge Concentration For 30 Consecutive Days (mg/l)	Maximum Daily Concentration (mg/l)
Oil and grease	10	15
pH	6.0-9.0(1)	6.0-9.0(1)
Copper, total	1.0	1.0
Iron, total	1.0	1.0
Nickel, total	1.0	2.0
Zinc, total	1.0	2.0
Total suspended (nonfilterable) solids (TSS)	30	100

NOTE:

1. Standard pH units effluent must be within the range presented.



LEGEND

—— PROPOSED FACILITIES

0 40 80 120 160

SCALE – FEET

FIGURE 6.2-1
PROPOSED PLOT PLAN
STATION AREA
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

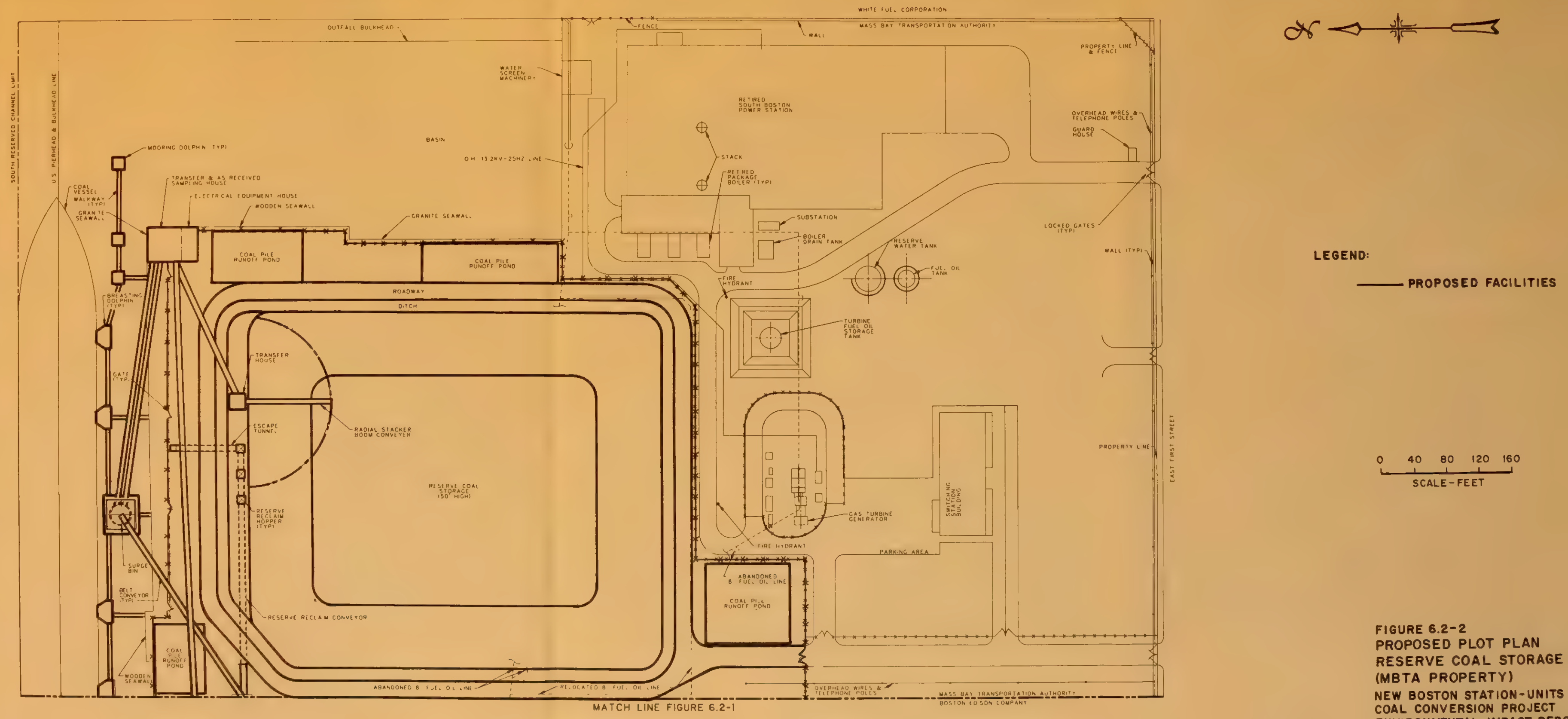


FIGURE 6.2-2
PROPOSED PLOT PLAN
RESERVE COAL STORAGE AREA
(MBTA PROPERTY)
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

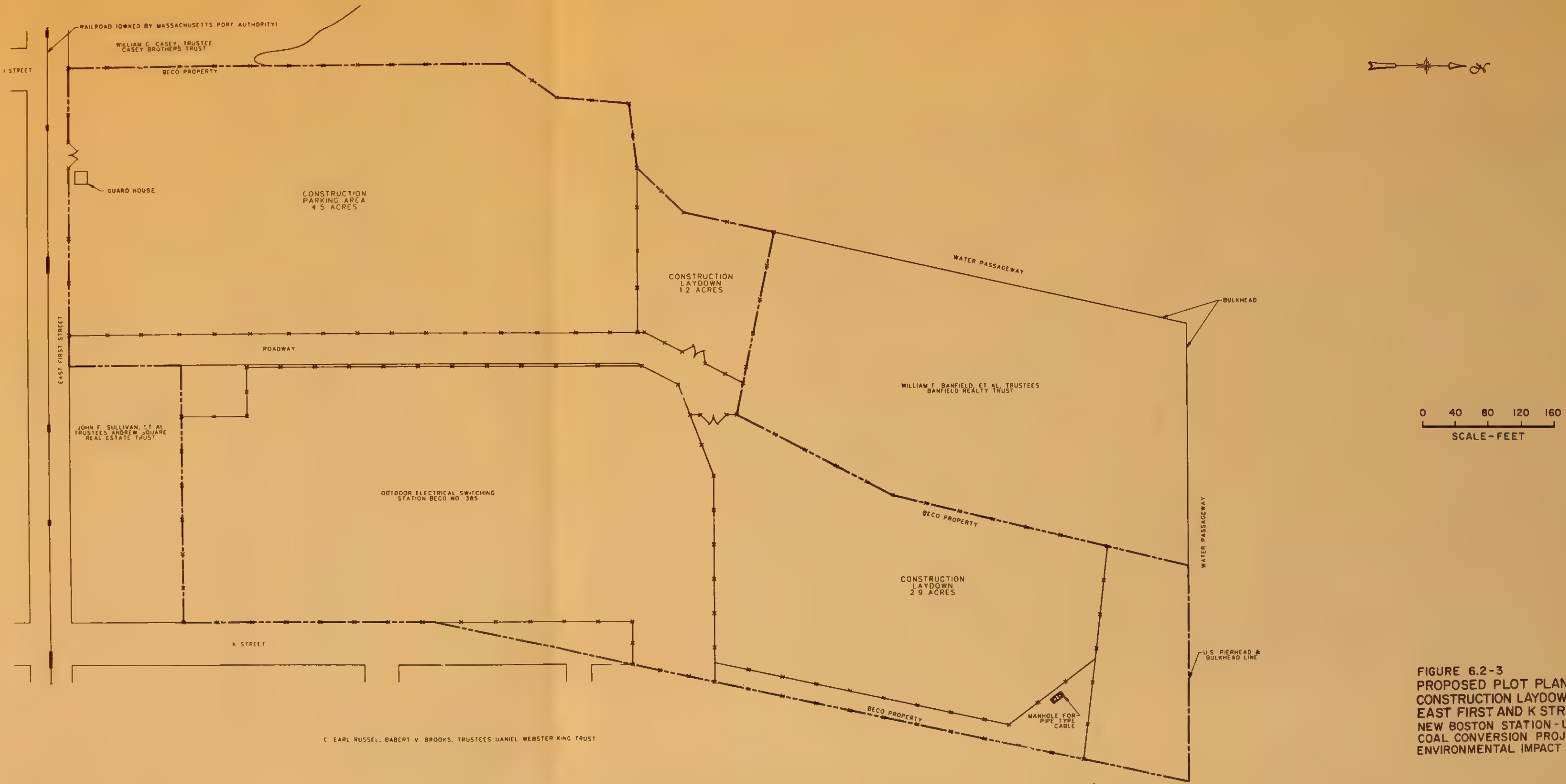


FIGURE 6.2-3
PROPOSED PLOT PLAN
CONSTRUCTION LAYDOWN AND PARKING
EAST FIRST AND K STREET PROPERTY
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

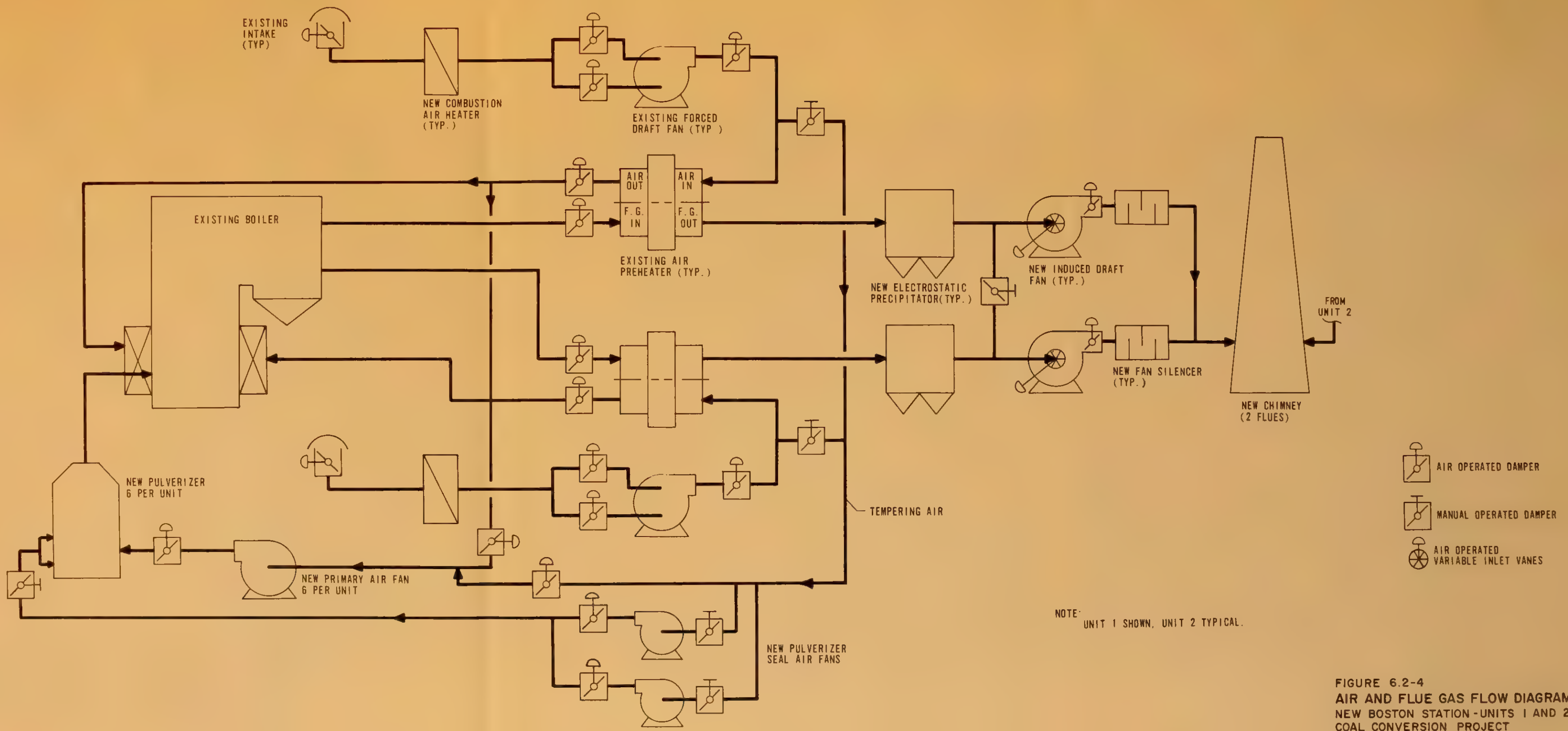
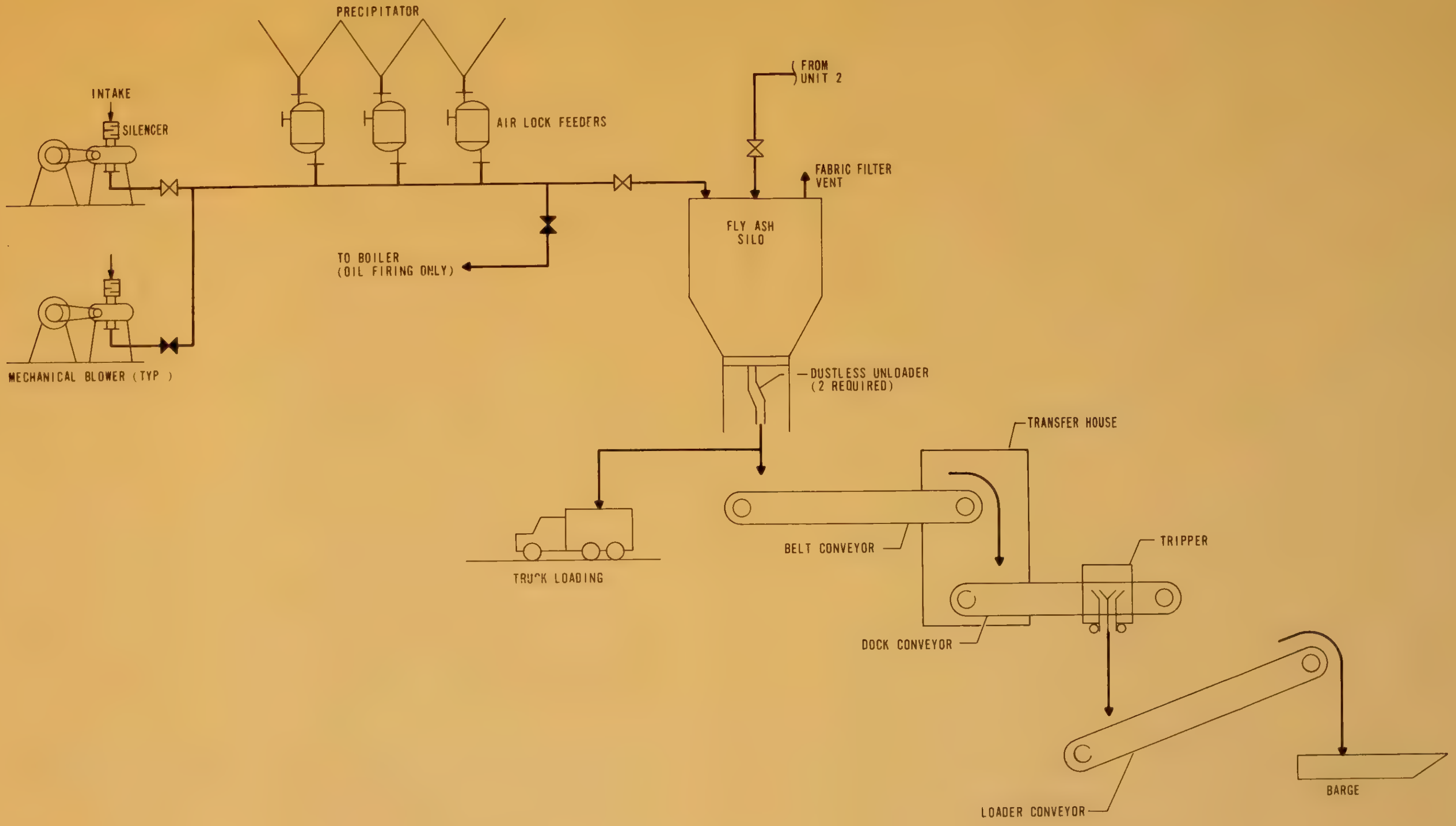

EXISTING INTAKE (TYP)
NEW COMBUSTION AIR HEATER (TYP.)
EXISTING FORCED DRAFT FAN (TYP.)
AIR OUT
AIR IN
F.G. IN
F.G. OUT
EXISTING AIR PREHEATER (TYP.)
EXISTING BOILER
NEW ELECTROSTATIC PRECIPITATOR(TYP.)
NEW INDUCED DRAFT FAN (TYP.)
NEW FAN SILENCER (TYP.)
NEW CHIMNEY (2 FLUES)
FROM UNIT 2
NEW PULVERIZER 6 PER UNIT
TEMPERING AIR
NEW PRIMARY AIR FAN 6 PER UNIT
NEW PULVERIZER SEAL AIR FANS
AIR OPERATED DAMPER
MANUAL OPERATED DAMPER
AIR OPERATED VARIABLE INLET VANES
NOTE: UNIT 1 SHOWN, UNIT 2 TYPICAL.

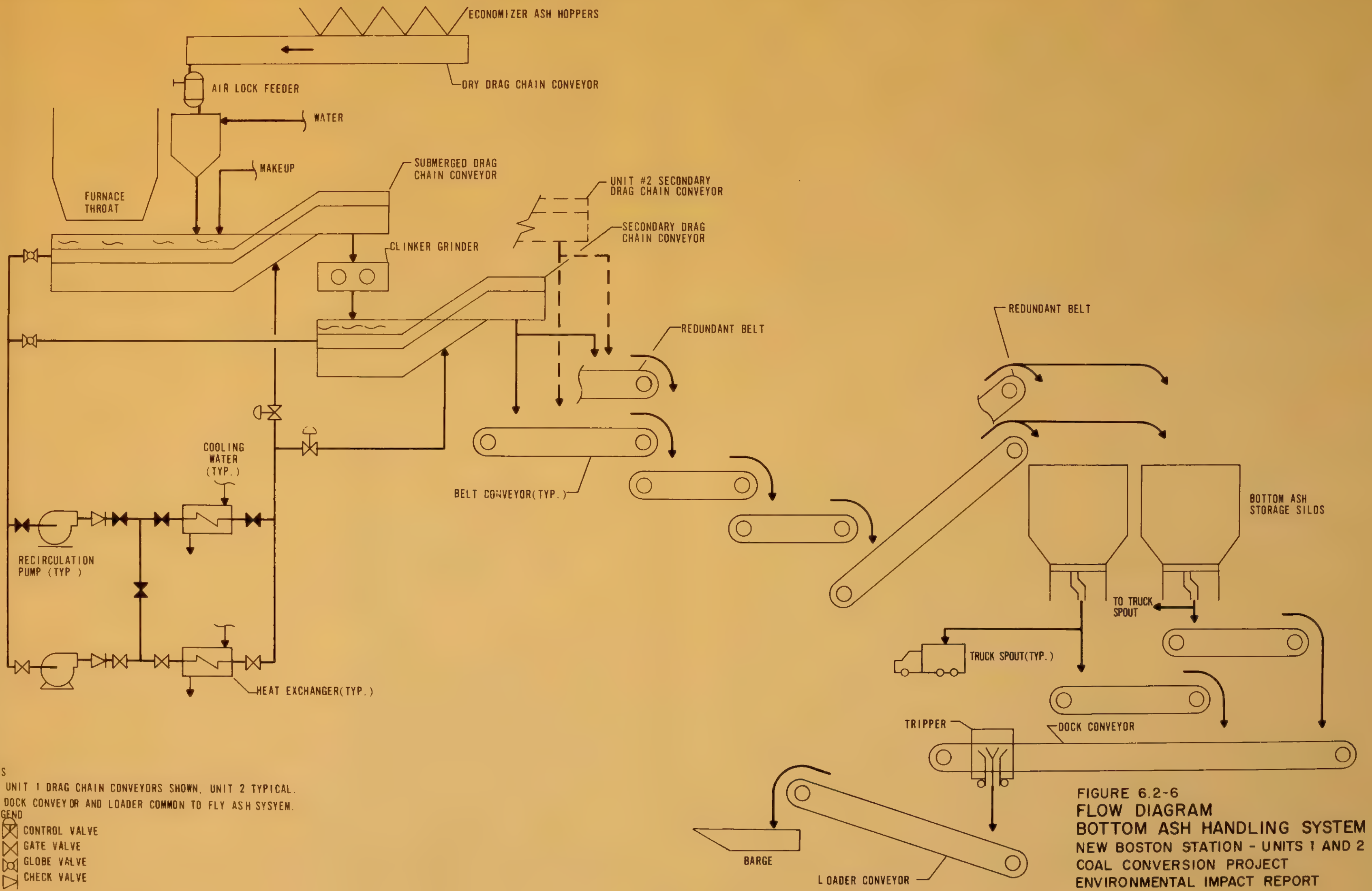
FIGURE 6.2-4
AIR AND FLUE GAS FLOW DIAGRAM
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTES

1. UNIT 1 SHOWN. UNIT 2 TYPICAL WITH COMMON SILO.
2. SPACE IS PROVIDED FOR SIMULTANEOUS UNLOADING TO 2 TRUCKS
3. DOCK CONVEYOR AND LOADER COMMON TU BOTTOM ASH SYSTEM.

FIGURE 6.2-5
FLOW DIAGRAM
FLY ASH HANDLING SYSTEM
NEW BOSTON STATION – UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTES

1 UNIT 1 DRAG CHAIN CONVEYORS SHOWN. UNIT 2 TYPICAL.

2 DOCK CONVEYOR AND LOADER COMMON TO FLY ASH SYSYEM.

LEGEND

CONTROL VALVE
GATE VALVE
GLOBE VALVE
CHECK VALVE

FIGURE 6.2-6
FLOW DIAGRAM
BOTTOM ASH HANDLING SYSTEM
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

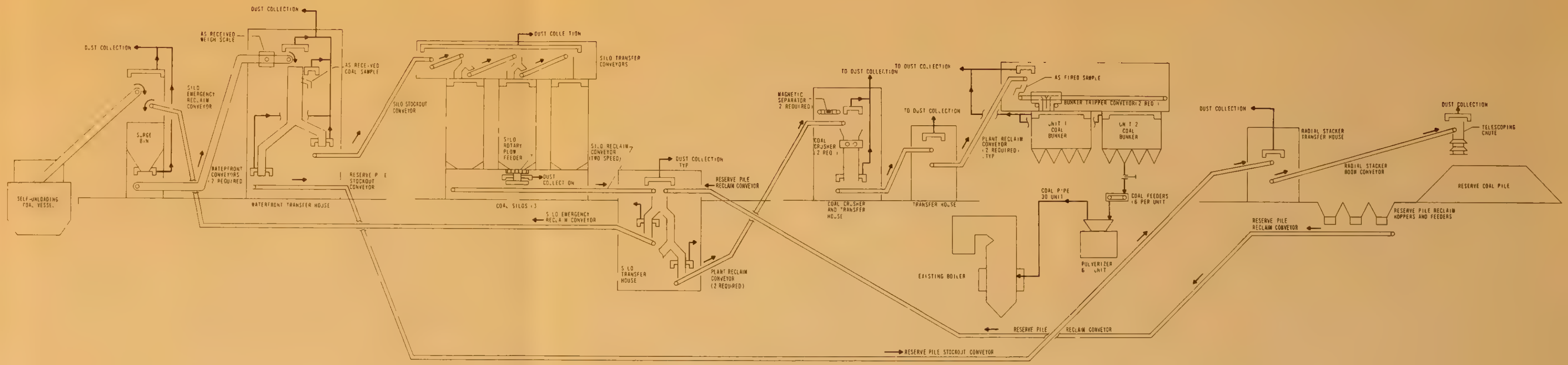

SELF-UNLOADING COAL VESSEL
DUST COLLECTION
SURGE BIN
SILO EMERGENCY RECLAIM CONVEYOR
AS RECEIVED WEIGH SCALE
DUST COLLECTION
AS RECEIVED COAL SAMPLE
WATERFRONT CONVEYORS (2 REQUIRED
RESERVE PILE STOCKOUT CONVEYOR
WATERFRONT TRANSFER HOUSE
SILO STOCKOUT CONVEYOR
DUST COLLECTION
SILO TRANSFER CONVEYORS
SILO ROTARY PLOW FEEDER
DUST COLLECTION
COAL SILOS (3
SILO RECLAIM CONVEYOR (TWO SPEED)
DUST COLLECTION TYP
RESERVE PILE RECLAIM CONVEYOR
SILO EMERGENCY RECLAIM CONVEYOR
SILO TRANSFER HOUSE
PLANT RECLAIM CONVEYOR (2 REQUIRED)
MAGNETIC SEPARATOR 2 REQUIRED)
TO DUST COLLECTION
COAL CRUSHER (2 REQ)
COAL CRUSHER AND TRANSFER HOUSE
TO DUST COLLECTION
TRANSFER HOUSE
TO DUST COLLECTION
AS FIRED SAMPLE
BUNKER TRIPPER CONVEYOR (2 REQ)
PLANT RECLAIM CONVEYOR (2 REQUIRED) TYP
UNIT 1 COAL BUNKER
UNIT 2 COAL BUNKER
COAL PIPE 30 UNIT
COAL FEEDERS (6 PER UNIT
EXISTING BOILER
PULVERIZER 6 UNIT
RESERVE PILE RECLAIM CONVEYOR
RESERVE PILE STOCKOUT CONVEYOR
DUST COLLECTION
RADIAL STACKER TRANSFER HOUSE
RADIAL STACKER BOOM CONVEYOR
DUST COLLECTION
TELESCOPING CHUTE
RESERVE COAL PILE
RESERVE PILE RECLAIM HOPPERS AND FEEDERS
RESERVE PILE RECLAIM CONVEYOR

FIGURE 6.2-7
COAL HANDLING FLOW DIAGRAM
NEW BOSTON STATION—UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

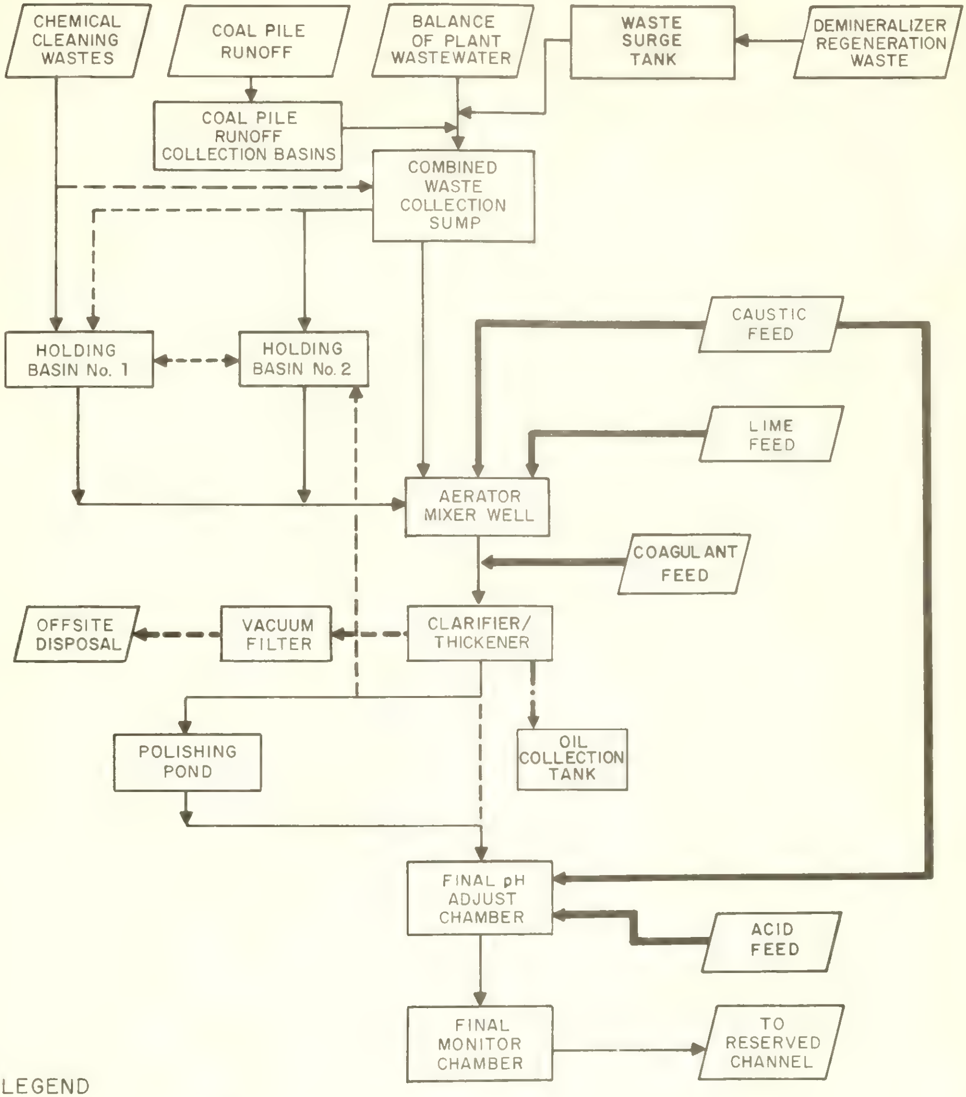


FIGURE 6.2-8

POSTCONVERSION WASTEWATER TREATMENT FLOW CHART

NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

6.3 COST-BENEFITS DESCRIPTION

6.3.1 Major Project Benefits

The proposed coal conversion of New Boston Station Units 1 and 2 will further the regional and national goal of reducing foreign oil imports by displacing approximately 7 million barrels of oil annually. The proposed Boston Edison Company's (BECO's) coal conversion program for New Boston Station Units 1 and 2, and Mystic Station Units 4, 5, and 6 will significantly benefit BECO's customers by providing an estimated $2.9 billion in fuel price savings by the year 2000. Assumptions and calculations used in the development of this estimate of fuel savings are provided in BECO's preliminary energy supply plan, Impact 2000, submitted in July 1982 in response to a request from the Massachusetts Department of Public Utilities.

In addition, the operating lives of the boilers and their associated turbine generators will be extended by approximately 15 years, thus stabilizing station employment and postponing the need to replace this generating capacity.

Local benefits provided by the proposed conversion of New Boston Station Units 1 and 2 include the creation of an estimated 47 permanent employee positions with BECO and about 500 construction jobs, on average, throughout the projected 42-month construction period. The coal conversion project will also provide an increase in the City of Boston's tax base due to additional capital investment in the station.

In addition to fuel savings and the creation of permanent, as well as temporary construction employment, there are additional economic benefits. Because coal is a domestic fuel, it will require the creation of additional employment in the coal mines, as well as associated railroad and water transport industries. The new plant equipment required for conversion to coal will result in factory orders with several suppliers and the potential for additional employment to design, engineer, manufacture, and transport all of this equipment.

6.3.2 Major Project Costs

To achieve the benefits identified above, the New Boston Station Units 1 and 2 coal conversion project will incur capital costs of about $500 million and increased annual operation and maintenance costs estimated at $4 million. However, all costs are considered in the $2.9 billion estimate of net savings due to the proposed BECO coal conversion program by the year 2000. Details of the cost estimates are provided in Impact 2000 (BECO 1982).

6.3.3 Reference

Impact 2000 - An Energy Plan Providing Initiatives for Managing Production and Consumption Trends to the Year 2000. BECO, Boston, Massachusetts. July 1982.

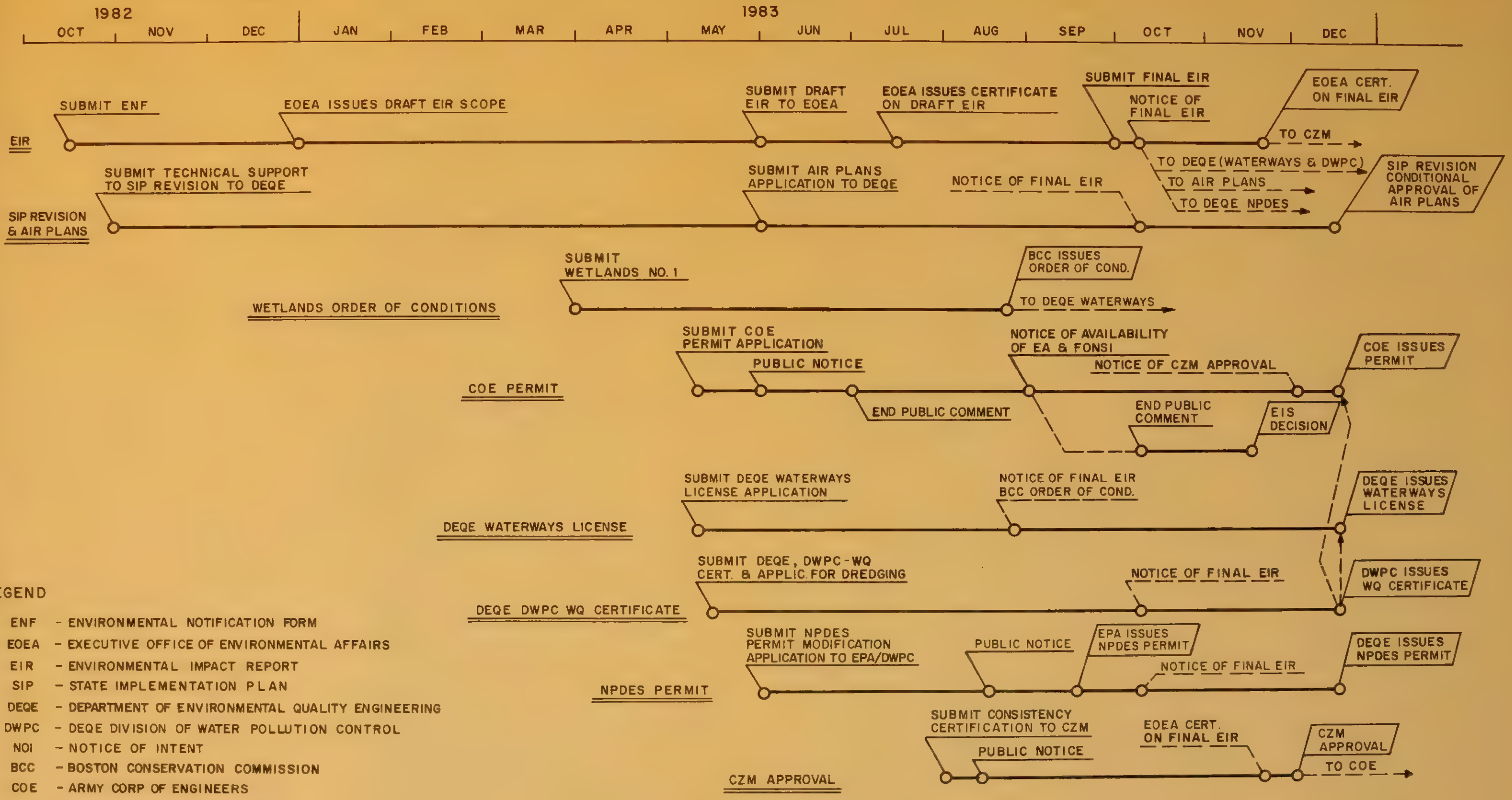
6.4 PROJECT SCHEDULE

Milestone summary schedules for the proposed New Boston Station Units 1 and 2 coal conversion project are presented in Figures 6.4-1 and 6.4-2. The schedule in Figure 6.4-1 covers preliminary engineering and environmental licensing activities currently underway. Major engineering and design, demolition and relocation, construction, and startup milestones are shown in Figure 6.4-2.

At this time Boston Edison Company (BECO) estimates startup on coal for the first New Boston Station unit will be in October 1987, and the second unit in June 1988. Underlying assumptions include the following:

1. All permits and licenses are received by January 1984; at this time major engineering, design, and procurement activities are scheduled to begin.
2. Construction work to be performed during critical periods of boiler outages will be accomplished by working two shifts, 40 hours per week per shift. All other construction work will be accomplished by working one shift, 40 hours per week.
3. Availability of system generation capacity allows boiler outages to be scheduled as shown on Figure 6.4-2.
4. A commitment can be made to the design coals in order for detailed engineering and preparation of equipment specifications to proceed, based on specific coal and ash analyses.
5. Multiple construction contracts are awarded which require engineering and design time early in the project to provide complete construction packages for bidding.

BECO plans to continue to thoroughly evaluate the proposed coal conversion project throughout 1983, from the planning, financial recovery, and licensing perspectives, to determine what prudent decisions can be made to improve the schedule without financial risk to the ratepayer and the stockholder.


1982
OCT
NOV
DEC
1983
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
EIR
SUBMIT ENF
EOEA ISSUES DRAFT EIR SCOPE
SUBMIT DRAFT EIR TO EOEA
EOEA ISSUES CERTIFICATE ON DRAFT EIR
SUBMIT FINAL EIR
NOTICE OF FINAL EIR
EOEA CERT. ON FINAL EIR
TO CZM
SIP REVISION & AIR PLANS
SUBMIT TECHNICAL SUPPORT TO SIP REVISION TO DEQE
SUBMIT AIR PLANS APPLICATION TO DEQE
NOTICE OF FINAL EIR
TO DEQE (WATERWAYS & DWPC)
TO AIR PLANS
TO DEQE NPDES
SIP REVISION CONDITIONAL APPROVAL OF AIR PLANS
WETLANDS ORDER OF CONDITIONS
SUBMIT WETLANDS NO. 1
BCC ISSUES ORDER OF COND.
TO DEQE WATERWAYS
COE PERMIT
SUBMIT COE PERMIT APPLICATION
PUBLIC NOTICE
END PUBLIC COMMENT
NOTICE OF AVAILABILITY OF EA & FONSI
NOTICE OF CZM APPROVAL
END PUBLIC COMMENT
EIS DECISION
COE ISSUES PERMIT
DEQE WATERWAYS LICENSE
SUBMIT DEQE WATERWAYS LICENSE APPLICATION
NOTICE OF FINAL EIR BCC ORDER OF COND.
DEQE ISSUES WATERWAYS LICENSE
DEQE DWPC WQ CERTIFICATE
SUBMIT DEQE, DWPC-WQ CERT. & APPLIC. FOR DREDGING
NOTICE OF FINAL EIR
DWPC ISSUES WQ CERTIFICATE
NPDES PERMIT
SUBMIT NPDES PERMIT MODIFICATION APPLICATION TO EPA/DWPC
PUBLIC NOTICE
EPA ISSUES NPDES PERMIT
NOTICE OF FINAL EIR
DEQE ISSUES NPDES PERMIT
CZM APPROVAL
SUBMIT CONSISTENCY CERTIFICATION TO CZM
PUBLIC NOTICE
EOEA CERT. ON FINAL EIR
CZM APPROVAL
TO COE

LEGEND

ENF - ENVIRONMENTAL NOTIFICATION FORM
EOEA - EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
EIR - ENVIRONMENTAL IMPACT REPORT
SIP - STATE IMPLEMENTATION PLAN
DEQE - DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING
DWPC - DEQE DIVISION OF WATER POLLUTION CONTROL
NOI - NOTICE OF INTENT
BCC - BOSTON CONSERVATION COMMISSION
COE - ARMY CORP OF ENGINEERS
EA - ENVIRONMENTAL ASSESSMENT
FONSI - FINDING OF NO SIGNIFICANT IMPACT
WQ CERT - WATER QUALITY CERTIFICATION (FROM DEQE, DWPC)
NPDES - NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
EPA - U.S. ENVIRONMENTAL PROTECTION AGENCY
CZM - COASTAL ZONE MANAGEMENT (OFFICE OF)
EIS - ENVIRONMENTAL IMPACT STATEMENT

FIGURE 6.4-1
SCHEDULE FOR PRELIMINARY ENGINEERING & ENVIRONMENTAL LICENSING ACTIVITIES
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

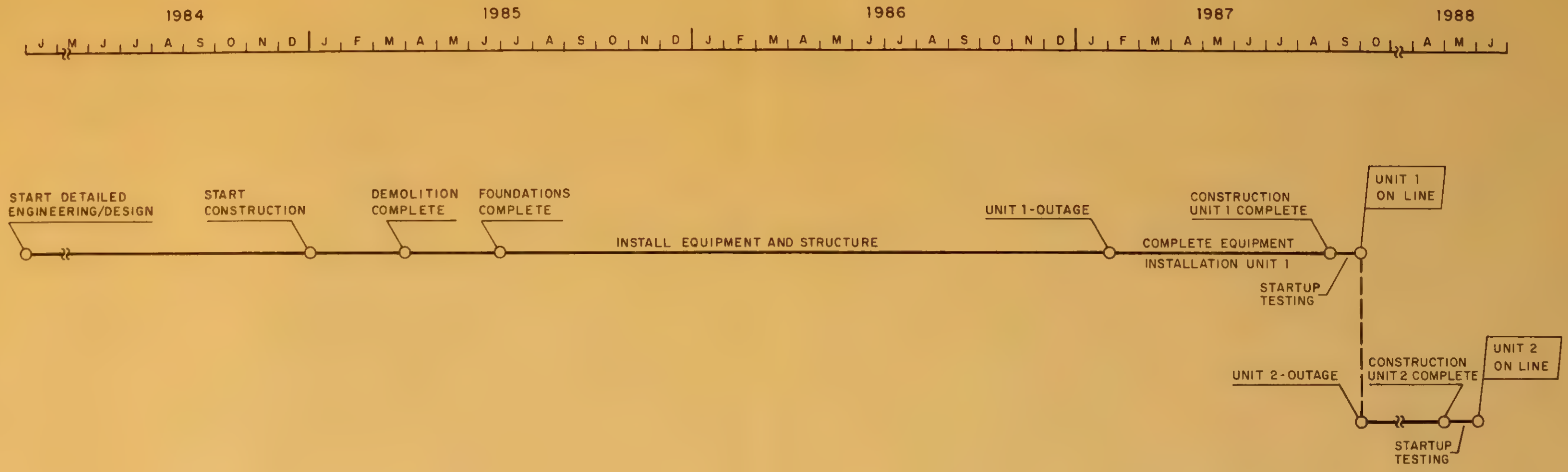


FIGURE 6.4-2

SCHEDULE FOR ENGINEERING & CONSTRUCTION

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

6.5 VISUAL RENDERINGS

The conversion to coal will alter the visual character of New Boston Station. Facilities to be added are identified on the plot plans presented in Section 6.2. The effect of the addition of these facilities on the visual character of the station is illustrated in the series of "before" and "after" photographs contained in Section 7.6. This visual character is viewed from many areas in the community. Additionally, a photograph of the physical model of New Boston Station is presented in Section 2.

SECTION 7

ESTIMATED IMPACTS OF THE PROPOSED PROJECT

7.1 AIR QUALITY IMPACTS

The impact of the coal conversion on air quality is addressed in this section. First, the emissions and associated impacts as they pertain to the construction phase are discussed. Second, operational impacts are described in detail with emphasis placed on the incremental increase or decrease in these impacts from current oil firing to proposed coal firing. The operational phase analysis is subdivided into four categories: pollutant emissions, atmospheric dispersion modeling, ground-level ambient impacts, and acid precipitation. The operational air quality impact modeling assessment, as it pertains to stack effluents, represents the combined impacts associated with the proposed New Boston and Mystic Station coal conversions.

7.1.1 Construction Phase Air Quality Impacts

During the construction period, unavoidable air pollutant emissions are likely to occur from various construction-related activities. The most prevalent construction emissions are fugitive dust. However, minor emissions of volatile organic compounds (VOCs) are also likely during construction. Emissions of fugitive dust and VOCs are generally limited to the immediate areas under construction or demolition, and are kept to a minimum through mitigation measures (see Section 11.1.3). Fugitive dust emissions are temporary and of periodic occurrences, and will not occur beyond the 42-month construction period. The following sections summarize the potential sources of fugitive dust and VOC emissions, and their related air quality impacts.

7.1.1.1 Fugitive Dust

Fugitive dust, also known as fugitive particulate matter, is generally defined as natural and/or man-associated dusts that become airborne due to the forces of wind or human activity. Construction-phase fugitive dust emissions are generated from the demolition of existing structures, vehicular activity, and the establishment of the reserve coal pile.

Demolition

Fugitive dust will occur during demolition of the machine shop, storeroom, welding shop, paint shop, and screen house, and to a lesser extent during the removal of existing equipment such as piping, ductwork, etc. The four existing steel stacks will also be demolished. Dust generated by demolition will be continuously controlled by keeping the area of greatest activity wetted.

Demolition of existing structures will comply with 310CMR7.09 (Dust, Odor, Construction, and Demolition). Air quality impacts associated with demolition will be insignificant and temporary.

All appropriate measures will be employed to prevent air emissions of friable (fragile) asbestos material during demolition. Requirements that will be adhered to include Massachusetts regulations 310CMR7.02 (Plan Approval and Emission Limitation) 310CMR7.09(5) (Dust, Odor, Construction, and Demolition), and 310CMR7.15(5) (Asbestos) and Federal regulation 40CFR61.20 (National Emission Standard for Hazardous Air Pollutant). Notices of intent for asbestos removal operations will be filed with the appropriate agencies prior to demolition, describing such activities in detail.

The U.S. Environmental Protection Agency (EPA) has approved two methods of preparing friable asbestos waste for disposal: wet packaging and processing into nonfriable forms. However, the Massachusetts Department of Environmental Quality Engineering (DEQE) policy for the handling and disposal of asbestos waste clearly favors wet packaging by requiring all nonpackaged asbestos waste to be transported to the disposal site in a slurry and in a closed vacuum truck system.

Traffic

Fugitive dust can also be generated by onsite vehicular activity. Specifically, operation of heavy equipment over unpaved construction laydown areas, and the working of areas being prepared for construction will result in unavoidable emissions of dust. However, as described in detail in Section 11.1.3, appropriate mitigation measures will be implemented as a means to minimize these emissions.

The types of equipment to be utilized during the construction phase include cranes, dump trucks, air compressors, bulldozers, front-end loaders, backhoes, etc. It is not possible at the present time to provide an estimate of the total number of pieces of heavy equipment to be used on the site. However, it has been estimated that a controlled emission rate of between 0.9 and 2.3 pounds of fugitive dust per vehicle mile traveled can be expected (EPA 1977). This estimate is based on a vehicle speed of between 15 and 25 mph and is highly dependent upon soil moisture and silt content. Vehicular activity will comply at all times with requirements specified in 310CMR7.09 (Dust, Odor, Construction, and Demolition) to ensure that there is no adverse air quality impact.

Establishing the Reserve Coal Pile

Although highly efficient dust collection/suppression techniques will be utilized in the coal handling and storage operations, as described in Sections 6.2.7 and 11.2.1.3, establishment of the reserve coal pile will result in small amounts of fugitive dust. The process of transferring 244,000 tons of coal from the self-unloading vessels to the reserve pile, and the working of the pile with coaldozers is conservatively estimated to generate a maximum controlled emission rate of 72 lb/hr of fugitive dust. Dust generated during working of the pile, which constitutes more than 90 percent of the 72 lb/hr emission rate, will be kept to a minimum by applying a wetting agent and/or water through a portable spray system (see Section 11.1.3). The overall fugitive dust control efficiency during establishment of the reserve coal pile is calculated to be approximately 95 percent. Air quality impacts attributed to establishment of the reserve coal pile are expected to be small and will be temporary, lasting only until the pile is established and covered with grass.

7.1.1.2 Volatile Organic Compounds (VOCs)

It is anticipated that total VOC emissions released into the atmosphere during construction will be extremely small. Potential sources of VOC emissions are the evaporative losses associated with onsite painting, refueling of construction equipment, and the application of adhesives and waterproofing chemicals. The frequency and extent of these activities is very limited and will have a minimal impact on air quality.

Exhaust emissions from construction equipment will also contain small amounts of VOCs resulting from incomplete combustion of fuel. However, due to the nature of heavy duty, diesel-powered construction vehicles, which allow for more complete combustion and use less volatile fuels than spark-ignited engines, VOC emissions are relatively low (EPA 1975b). In addition, construction equipment will receive frequent and proper maintenance, thereby keeping these emissions to a minimum. No adverse air quality impacts are anticipated due to these minor emissions of VOCs.

7.1.2 Operational Phase Air Quality Impacts

The combined air quality impacts of New Boston and Mystic Stations coal conversions are analyzed in this section, and the resultant ground level concentrations of pollutants are compared, where applicable, to the ambient air quality standards. Although Prevention of Significant Deterioration (PSD) regulations are not specifically applicable to the proposed coal conversions in that a PSD permit is not required (Section 3.2.1), New Boston and Mystic Stations' consumption of available increment is included in the impact analysis. It will be shown that the stations' contribution to ground-level concentrations are not only within the allowable PSD increments but actually make more increment available in some areas. In addition, it will be seen that the emissions will neither cause nor significantly contribute to any violation of national or state ambient air quality standards.

The ambient air quality impact analysis is dependent upon several chimney and flue gas design parameters, and pollutant emission rates. The atmospheric dispersion modeling performed to support the conclusions of the impact assessment discussed in the following subsections and the sulfur dioxide (SO_2) State Implementation Plan (SIP) revision technical support (see Appendix C) were based upon preliminary conceptual design parameters. However, a more refined conceptual design has been completed. This latest design includes several modifications to plant components which ultimately affect the input parameters to the air quality modeling assessment, i.e., flue gas exit velocities, temperatures, etc. To ensure that the refined conceptual design does not significantly alter the results of the original air quality impact assessment, a remodeling effort was undertaken using the same modeling approach but incorporating the modified input parameters. Results show that predicted ambient air quality impact concentrations attributed to the coal conversion do not change significantly from the original modeling, which is described below. All conclusions reached remain unchanged. A discussion of the results of the remodeling analysis, demonstrating the insignificant changes to the original modeling, is provided in Appendix D.

7.1.2.1 Emissions From New Boston Station

Pollutant emission rates were calculated for Units 1 and 2 based on boiler heat input rates, coal and oil characteristics, and plant operating data. The maximum continuous heat input rating utilized in the analysis for each of the New Boston Station boilers is 3238 MBtu/hr. Emission rates of criteria and noncriteria pollutants were calculated for residual oil firing using actual operating conditions and based on plant-specific and typical residual oil analyses, results of emissions testing, and/or emission factors developed by the EPA. Emission rates for coal firing were calculated assuming 100 percent operating load and based on guaranteed or expected equipment performance, design coal or typical eastern bituminous coal constituent analyses, and/or EPA emission factors.

Emission rates used in predicting existing short-term (1-hour, 3-hour, 8-hour, 24-hour) ambient air quality concentrations are representative of the average hourly emission rate on the day having the highest 24-hour fuel oil consumption in 1980 and 1981. Annual average emission rates for oil firing are determined by dividing the annual fuel use by the number of operating hours each year (1980 and 1981) and then averaging these values. Because emission rates for the proposed coal-firing configuration are based on 100 percent load operation, they represent maximum possible emissions from New Boston Station.

The residual oil presently being burned in Units 1 and 2 has an average heating value of approximately 145,500 Btu/gallon and a maximum sulfur content of 0.55 lb/MBtu. As described in Section 5.3.1.2, this fuel is in compliance with current SIP limitations. In the estimation of coal-firing emission rates, an eastern bituminous coal with a heating value of 12,150 Btu/lb, an ash content of 11 percent, and a maximum sulfur content (30-day average) of 1.21 lb/MBtu (1.5 percent sulfur) was selected.

The following discusses the emissions of criteria pollutants, including respirable particulate matter and fugitive particulates; and noncriteria pollutants, including sulfates, trace elements, radionuclides, and organics, during existing oil firing and proposed coal firing at New Boston Station.

7.1.2.1.1 Criteria Pollutants

Maximum emissions of particulate matter (PM) (including the respirable fraction), sulfur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), VOCs which are precursors to ozone, and lead (Pb) have been estimated for the existing oil-firing and the proposed coal-firing configurations at New Boston Station. The emission rates for the oil- and coal-firing scenarios of each criteria pollutant are listed in Table 7.1-1. Table 7.1-2 presents a particle size distribution of PM emissions including the respirable fraction for the oil- and coal-firing scenarios. Fugitive dust emissions from the proposed coal storage and handling system are listed in Table 7.1-3. A detailed description on a pollutant-specific basis follows:

Particulate Matter (PM)

The Massachusetts SIP establishes a maximum limit on the allowable emission rate of PM from fossil-fuel utilization facilities in Metropolitan Boston of 0.12 lb/MBtu (see Section 5.3.1.2). The current oil-fired PM emission rate from Units 1 and 2 is approximately 0.034 lb/MBtu. As shown in Table 7.1-1, the estimated maximum hourly emission rate is 238 lb/hr. Current oil-fired emissions of PM are well within the SIP limitation of 0.12 lb/MBtu, or 777 lb/hr.

Emissions of PM during proposed coal firing will be controlled to a level guaranteed not to exceed 0.08 lb/MBtu, which is equivalent to a maximum emission rate of 518 lb/hr. Although higher than the current oil-fired emissions, maximum PM emissions during coal firing will continue to be well within the current SIP limitation.

Respirable Particulate Matter (RPM)

As described in Section 5.3.1.1, RPM is generally considered as that fraction of PM with an aerodynamic diameter less than 2.5 microns (3.94×10^{-5} inches). Typical particle size distributions of fly ash from oil-firing power plants without control equipment, and coal-firing power plants utilizing electrostatic precipitators (ESPs) are presented in Table 7.1-2 (Brady 1982, EPA 1975a).

RPM emissions typically comprise 65 percent of the PM emissions from oil-fired boilers (Brady 1982). Since oil-firing at New Boston Station does not incorporate any PM control equipment, the entire 65 percent of PM identified as RPM is emitted into the atmosphere. Therefore, based on the combined current PM emission rate from Units 1 and 2 of 238 lb/hr, the RPM emission rate is estimated to be 155 lb/hr.

The percentage of PM produced as RPM by coal-fired boilers is much less than oil-fired boilers (i.e., 4 percent as compared to 65 percent) (EPA 1975a). RPM will be collected by the ESPs. However, the collection efficiency of the submicron (less than 1 micron) fraction of RPM is in doubt due to a lack of data. One study, which does include submicron sampling at the inlet and outlet of an ESP with an overall collection efficiency of 99.7 percent, indicates a control efficiency of 97.4 percent for particles less 2.5 microns in diameter (EPA 1975a). On a particle mass basis, 35 percent of the total PM emissions were less than 2.5 microns. Other studies have very limited submicron data. However, the data are in relatively good agreement for particle diameters of 1 to 2.5 microns, indicating 95 percent to greater than 99 percent collection efficiency (EPA 1980b). Assuming that RPM emissions are 35 percent of the maximum PM emission rate of 518 lb/hr, the combined maximum RPM emission rate from Units 1 and 2 is estimated to be 182 lb/hr (see Table 7.1-2).

Sulfur Dioxide (SO_2)

Sulfur in fuel is converted to SO_2 in the furnace combustion zone and then emitted to the atmosphere as a gas. A small amount of sulfur may be retained in the form of ash in the furnace or in the dust collector, if utilized. Sulfur retention in the ash is usually very low with oil firing, but can be as high as 5 to 10 percent of the fuel sulfur when firing eastern coals. In addition, a small percentage of sulfur can be emitted in the form of sulfate. However, for purposes of estimating SO_2 emissions, it is conservatively assumed for existing oil firing and future coal firing that 100 percent of the sulfur in fuel is converted to gaseous SO_2.

The current oil-fired emission rate is in compliance with the allowable emission limitation established in the current state sulfur-in-fuel regulation, or 0.55 lb of sulfur/MBtu. Total SO_2 emissions from current oil firing are 7418 lb/hr based on 1 percent sulfur fuel oil.

Emissions of SO_2 during coal firing are based on a maximum coal sulfur content (averaged over a 30-day period) of 1.21 lb/MBtu, which is equivalent to 1.5 percent sulfur. Therefore, the maximum emission rate during coal firing is estimated to be 15,984 lb/hr.

Nitrogen Oxides (NOx)

Emissions of NOx depend upon the amount of nitrogen in the fuel and on the combustion configuration of the boiler. Flame temperature and available oxygen are critical factors in the generation of NOx. Therefore, burner design and combustion control settings are a dominant factor in the resulting emissions.

The existing NOx emission rate from Units 1 and 2, which has been determined through stack testing, is approximately 0.43 lb/MBtu, which is equivalent to 3015 lb/hr. There is no SIP requirement limiting NOx emissions from existing sources.

Generally, a boiler will emit a larger amount of NOx when it fires coal as opposed to oil. It is estimated that the NOx emission rate during proposed coal firing will not exceed 0.8 lb/MBtu. Therefore, the maximum NOx emissions are estimated to be 5180 lb/hr.

Carbon Monoxide (CO)

The combustion efficiency of the boiler determines the amount of CO emitted. CO emissions are generally minimized by carefully controlling the air-to-fuel ratio, combustion temperature, and flue gas residence time.

The estimate of CO emissions under the present oil-firing configuration is based upon an EPA emission factor specifically applicable to utility boilers firing residual oil. It is estimated that the existing CO emission rate is 241 lb/hr.

Similarly, emissions of CO during coal firing are determined by utilizing an EPA emission factor developed specifically for pulverized coal-fired utility boilers. As seen in Table 7.1-1, CO emissions during proposed coal firing, which are estimated to be 160 lb/hr for Units 1 and 2 combined, will decrease by approximately 34 percent from the current oil-fired CO emissions.

Volatile Organic Compounds (VOCs)

Emissions of VOCs from boilers firing oil or coal are generally emitted in small amounts. Maintaining proper combustion conditions ensures that VOC emissions are kept to a minimum.

Emissions of VOCs from present oil firing and future coal firing are each estimated based on the applicable EPA emission factor for utility boilers. Maximum VOC emissions are estimated to be 39 lb/hr for oil firing, and 18.6 lb/hr for coal firing. This represents a decrease in emissions of approximately 52 percent from oil firing to coal firing.

Lead (Pb)

Emissions of Pb during oil or coal firing are dependent upon its concentration in the fuel which is generally very small. Pb emissions are in the form of PM and, as such, can be controlled by particulate collection devices.

Emissions of Pb from oil-firing were estimated utilizing an emission factor recently developed for residual oil-fired utility boilers, based on the existing data base (PEDCO 1982). This approach results in a more conservative (higher) emission rate in comparison to utilization of the EPA emission factor (EPA 1981). Total Pb emissions from current oil-firing are estimated to be 0.3260 lb/hr.

The estimate of Pb emissions during coal firing was determined utilizing an average Pb concentration of 5.9 ppm, based on the constituent analysis of 23 eastern coals (EPA 1980b). The emission estimate considers Pb partitioning between fly ash and bottom ash, and collection by ESPs. For ESPs with collection efficiencies equal to or greater than 99 percent, such as the ESPs proposed for the New Boston Station, Pb concentrations in the flue gases are reduced by approximately 91.6 percent (EPA 1980b). The maximum coal-fired emission rate is estimated to be 0.2558 lb/hr, or approximately 22 percent less than the estimated oil-fired emission rate.

Fugitive Particulates

As described in Section 7.1.1.1, fugitive particulates are natural and/or man-associated dusts that become airborne due to the forces of wind or human activity. Currently, there are no significant fugitive particulate emissions at New Boston Station. During coal firing, the coal storage and handling operation is a source of fugitive particulate emissions.

Fugitive particulates emanating from the coal storage and handling system are minimized by the application of highly efficient fugitive dust collection and suppression techniques (see Sections 6.2.7 and 11.2.1.3). Table 7.1-3 presents a summary of the various fugitive dust emission sources in the coal storage and handling system, and the uncontrolled and controlled emissions of fugitive particulates from each. The annual emissions of fugitive particulates are estimated to be 1.76 tons/year. The overall efficiency of the fugitive dust control system is estimated to be approximately 98.8 percent.

7.1.2.1.2 Noncriteria Pollutants

Emissions of sulfates, trace elements, radionuclides, and organics are also released from fossil-fuel combustion sources, but generally in small quantities. Although exact emissions of these noncriteria pollutants are not generally known or easily determined, independent studies have been performed with relatively good success. Results of the studies have been applied, where applicable, to approximate maximum emission rates of these noncriteria pollutants at New Boston Station.

Sulfates

SO_2 formed during fuel combustion partially oxidizes to sulfur trioxide (SO_3) in the flue gas, and in the presence of moisture SO_3 will react to form sulfates. Most of the sulfates are absorbed on fly ash particles and may be effectively removed from the flue gas by particulate control equipment.

It has been estimated, based on samples collected at a residual oil-fired power plant and coal-fired power plant, that an average of 40 percent and 8 percent, respectively, of the PM emissions from the boilers are in the form of particulate sulfate (EPA 1978a). Applying these criteria to New Boston Station, current maximum oil-fired sulfate emissions (no controls) are estimated at 95 lb/hr, and maximum coal-fired emissions (with ESPs) are estimated at 41 lb/hr, or a decrease of approximately 57 percent.

Trace Elements

Fossil fuels contain various concentrations of trace elements. Upon combustion, the trace metals leave the boiler with either the bottom ash or the fly ash, the ratio of which is dependent upon their respective volatility. Some elements (aluminum, magnesium) do not volatilize upon combustion but remain as particulates. Other elements (cadmium, selenium) vaporize upon combustion but partially condense on, and are emitted as, fine particulate. Still others (mercury) vaporize during combustion and remain in gaseous form in the flue gas.

Coal is probably the most extensively analyzed fuel for trace elements. Table 7.1-4 presents the mean concentrations of 20 trace elements for 23 samples of eastern coals (EPA 1980b). Also listed in Table 7.1-4 are partitioning percentages of the trace elements between bottom ash and fly ash (i.e., in flue gas), and trace element collection efficiencies for an ESP as observed at utility units similar to New Boston Station's design. Because a specific coal supply has not been selected, these data were utilized in estimating the trace element emission rates during coal firing at Units 1 and 2.

When possible, estimates of trace element emission rates during residual oil firing were based on the trace element concentrations of the oil used at New Boston Station. Emissions of other trace elements were based on uncontrolled emission factors for residual oil-fired utility boilers or trace element concentrations of a typical residual oil (PEDCO 1982). These trace element concentrations and emission factors are listed in Table 7.1-5. Results are shown in Table 7.1-6.

Radionuclides

Radionuclides are released to the atmosphere in small amounts during the combustion of fossil fuel. Similar to other pollutants (e.g., trace elements, SO_2), the quantity of radionuclide emissions varies in accordance with the radionuclide's naturally occurring concentration in the fuel. It is known that fuel oil and coal generally contain very minute quantities of radioactive species in the uranium (U), actinium (Ac), and thorium (Th) series. However, the availability of sufficient and quantifiable emissions data is limited for radionuclides. Estimates presented herein are based on the limited emissions data obtained through testing at other similar oil- and coal-fired facilities (EPA 1979b, Eisenbud 1964). Because radionuclides are primarily in the form of particulates, they can be removed from the flue gas by particulate collectors.

Estimates of emissions of radionuclides from current oil firing are shown in Table 7.1-7. The three principal radioactive species detected in the flue gas of oil-fired power plant are radium-226 (Ra-226), Ra-228, and Th-228. No removal of these particles is presently occurring.

Although very small in quantity, estimated emissions of radionuclides during coal firing are generally detectable in six species. Listed in Table 7.1-7, these include U, Th, Ra, Pb, polonium (Po), and bismuth (Bi). The utilization of ESPs is expected to remove 99 percent of the radionuclides in the flue gas as fly ash (EPA 1979b). The remaining 1 percent is released into the atmosphere. It is conservatively assumed in the estimation of radionuclide emissions shown in Table 7.1-7 that 100 percent of the naturally occurring radionuclides in the coal are released to the flue gas as a fly ash. However, in actuality, it can be expected that up to 20 percent of the radionuclides in the coal will deposit in the bottom ash.

Radon (Rn) is also emitted in the flue gas from the combustion of coal. However, Rn emissions were not calculated because the impact of Rn is even less than the insignificant impact from particulate radionuclides (EPA 1979b). See Section 7.1.2.3.

Emissions of radionuclides in the form of Rn can also be emitted from the reserve coal pile. However, the emission rate of this nuclide is even less than the emission rate occurring in normal soils (EPA 1979b). Therefore, Rn emanation from the New Boston Station reserve coal pile will in all likelihood result in an improvement over the existing Rn emissions from the surrounding soil at New Boston Station.

Organics

The emission of organics to the atmosphere occurs in trace amounts during the burning of fossil fuels, primarily due to incomplete combustion. However, organics are also present as naturally occurring constituents in fossil fuels. Since organics from fossil fuel facilities are generated primarily by incomplete combustion, their emissions are highly dependent on the type and condition of control equipment used, feed characteristics, and operating conditions (EPA 1978b).

Reliable emissions data for organics from oil and coal firing are extremely limited. Estimates are provided, however, for emissions of three species of organics for which a limited emissions data base exists (PEDCO 1982). They include benzo(a)pyrene (BaP), formaldehyde (HCHO), and polycyclic organic matter (POM). It is important to note that BaP is calculated separately from POM, even though BaP is a POM compound and is included in POM emission estimates.

As shown in Table 7.1-8, the estimated emissions of these compounds are extremely small during both oil and coal firing, although coal-firing emissions are slightly higher (PEDCO 1982). However, during coal firing even emissions of HCHO, which has the highest emission rate, are extremely small, i.e., less than 0.9 lb/hr for Units 1 and 2 combined.

The reserve coal pile is also a potential source of organics, specifically POM (EPA 1978b). Emissions of small amounts of POM from the reserve coal pile may possibly occur during unlikely instances of spontaneous combustion. However, as described in Section 6.2.7, the coal pile will be compacted to eliminate air pockets, thereby minimizing any spontaneous combustion episodes. Any such occurrences will be quickly extinguished (see Section 11.2.1.4).

7.1.2.2 Dispersion Modeling

The following discussion is intended to familiarize the reader with the basic concept of atmospheric dispersion modeling, the parameters needed to estimate the dispersion of pollutants, and the effects of physical structures and natural phenomena on pollutant dispersion. Specific input data utilized in the atmospheric modeling for New Boston and Mystic Stations are then summarized. The reader is referred to Appendix C, Technical Support for SIP Revision, for a detailed technical discussion of the modeling assessment performed for the proposed coal conversions.

An atmospheric dispersion model is a mathematical tool used to estimate the impact on ambient air quality due to emissions from a specific source(s). The atmospheric dispersion model approximates the mechanisms which cause dispersion in the atmosphere. Most dispersion models for stationary sources are based on the assumption that the flue gas leaving a chimney disperses in "Gaussian" distribution (i.e., bell-shaped cross-sectional distribution) as it moves downwind.

An atmospheric dispersion model uses meteorological data (generally 1 to 5 years) which is temporally and spatially representative of the source(s) being modeled. The important meteorological parameters considered in a model are wind speed, wind direction, and atmospheric stability. Wind speed determines the amount of ambient air that dilutes the pollutant plume. Wind direction dictates the path of a plume. Stability represents the degree of mixing occurring in the atmosphere.

Dispersion Model Selection

The EPA's Industrial Source Complex (ISC) atmospheric dispersion model was used to predict air quality impacts of Mystic and New Boston Stations coal conversions on the overall ambient air quality throughout Metropolitan Boston. The ISC model is a very versatile model which utilizes sequential hourly meteorological data, multiple sources of varying types, and an extensive receptor grid. The use of the ISC model and related modeling procedures were approved by the DEQE and EPA prior to modeling. A brief description of the most significant features of the ISC model follows:

1. Meteorological Data Preprocessor

   A preprocessor model processes the hourly National Weather Service (NWS) meteorological data into the acceptable format for the ISC model. In addition, the preprocessor model determines the appropriate stability category, wind direction vector, and mixing height for each hour of the data base. These three important meteorological parameters are briefly described.

- Stability Classification

  Stability represents the ability of the atmosphere to disperse a pollutant. A windy, sunny day promotes an unstable (much dispersion) condition. A clear, calm night usually produces a very stable environment. There is an algorithm (mathematical procedure) in the preprocessor model which incorporates wind speed, solar radiation, and cloud cover to classify the stability of each hour into one of six stability categories (A through F).

- Wind Direction Classification

  Hourly NWS wind directions are recorded to the nearest 10° azimuth. The preprocessor model randomly varies the hourly NWS wind direction by +4° to -5° to simulate natural fluctuations. Hours that are defined as calm by the NWS are not associated with any wind direction. However, the ISC model requires a wind direction value for each hour it considers. Consequently, the preprocessor model assigns the last noncalm wind direction to each calm hour.

- Mixing Height Determination

  The entire vertical extent of the atmosphere is not available for dispersing pollutants. The amount of air available for dispersing pollutants is usually limited by an elevated stable layer. This layer acts as a "blanket" to limit mixing of the pollutants to a ground-based unstable layer whose height is defined as the "mixing height." Mixing heights are determined from upper air soundings which are routinely taken twice a day by the NWS. The preprocessor model uses these two mixing heights and interpolates values for the intervening hours.

2. Plume Rise Determination

The ISC model has the ability to estimate plume rise as a function of downwind distance. Plume rise is an important consideration in estimating ground-level concentrations because the higher the plume is above a receptor, the lower the concentration at the receptor.

Plume rise is basically a function of momentum (how fast the flue gas is coming out of the stack) and buoyancy (temperature of the effluents). Plume rise is greater for unstable conditions than for stable conditions. During windy conditions, the plume will be more bent over (lower plume rise) than during light wind conditions.

3. Building Effects

There is a region which extends downwind of a building that is characterized by turbulence generated by the interaction of the wind with the building itself. This region is called the building wake region and it extends approximately 10 building heights downwind of the structure. The height of the wake region is approximately 2.5 times the building height. The turbulence generated by the building in this region is more significant than the associated atmospheric turbulence. Consequently, if the plume enters this region, the downward dispersion of the plume will be more rapid.

Plume rise is an important factor in determining affect of the building wake region on the plume. Only the momentum aspect of plume rise is considered by the ISC model in the building wake-region determination criteria.

4. Stack-Tip Downwash

If the wind speed is high enough, there is a tendency for a region of low pressure to exist directly in the lee of the top of the chimney (or stack). This condition causes the plume to "wash down" the side of the top of the chimney. This plume action is termed "stack-tip downwash" and is basically a function of the ambient wind speed and the flue gas exit velocity. The ISC model accounts for this condition by mathematically lowering the chimney height. The ISC model begins to modify the chimney height when the ambient wind speed is 1.5 times the flue gas exit velocity.

Dispersion Model Input Data

There are three basic input data categories for the ISC model: chimney parameters, meteorology, and receptor data. There are a number of option switches contained in the ISC model. These are used to make adjustments in the treatment of the input parameters or dispersion calculations. The settings of the option switches used in this analysis are provided in Appendix C.

1. Flue Gas and Chimney Parameters

The ISC model requires as input several chimney and flue gas parameters representative of operating conditions. These parameters include chimney height, chimney exit diameter, flue gas temperature, and flue gas exit velocity. In addition, the pollutant emission rate must be provided. Since the modeling analysis was performed primarily as technical support for an SO_2 SIP revision, SO_2 emission rates representative of 1.0 percent sulfur oil and 1.5 percent sulfur coal were input to the model for each station. These data are shown in Table 7.1-9 in metric units as required by the model.

The flue gas and chimney parameters, and locations of all other major sources of SO_2 within 12.4 miles of New Boston and Mystic Stations were also incorporated into the ISC model so as to assess their contribution to the total ambient concentration in Metropolitan Boston. These data are provided in Appendix C.

2. Meteorological Parameters

Five years (1977 through 1981) of surface meteorological data collected at the Logan International Airport Weather Service Office were used in the ISC model. Upper air observations for the same period recorded at the Portland, Maine NWS were used. For the New Boston and Mystic Station site areas, the Portland NWS station was determined to be the most representative upper air station among the other potential candidate stations (Caribou, Maine and Chatham, Massachusetts).

3. Receptor Grid and Topography

A total of 497 receptors were included in the ISC modeling. PSD increment consumption was evaluated at 166 receptors, and compliance with the National Ambient Air Quality Standards (NAAQS) was assessed for all 497 receptors. The 497 receptor locations, expressed in Universal Transverse Mercator (UTM) coordinates, and their elevations above mean sea level are provided in Appendix C.

Modeling for Other Pollutants

The modeling procedures for the other criteria and noncriteria pollutants were based on the above-mentioned ISC modeling. Since the pollutant concentrations predicted by the ISC model are directly proportional to the emission rate, running the ISC model for any other pollutant is unnecessary since all other input parameters remain the same. Files of the hour-by-hour ambient

SO_2 predicted concentrations were modified by the ratio of other selected pollutant emission rates to the SO_2 emission rate. These new scaled files were analyzed in a manner similar to the SO_2 analysis.

This scaling approach was applied only to the SO_2 ambient concentration files for 1980. The year 1980 was selected as the analysis year because the results of the SO_2 modeling indicated that the meteorology for 1980 caused the highest ambient concentrations (i.e., worst case) during coal firing.

7.1.2.3 Ambient Impact Analysis

A description of the impacts on ambient air quality resulting from conversion to coal at New Boston and Mystic Stations is provided in the following subsections. The consumption of available PSD increment is included in the analysis, although the PSD regulations are not applicable to the proposed coal conversions.

7.1.2.3.1 Criteria Pollutants

Sulfur Dioxide (SO_2)

As stated, the ISC model was utilized to assess the effect on ambient SO_2 concentrations of proposed coal firing at New Boston Station Units 1 and 2, and Mystic Station Units 4, 5, and 6. The proposed use of maximum 1.5 percent sulfur content coal (30-day average) represents an increase in SO_2 emissions. The modeling study was used to determine compliance with Massachusetts and National Ambient Air Quality Standards and PSD increments, even though the proposed conversions do not require a PSD permit (see Section 3.1.1).

Dispersion of emissions from all other major sources of SO_2 affecting ambient SO_2 concentrations in Metropolitan Boston were also simulated by the ISC model. Measured ambient SO_2 concentrations throughout Metropolitan Boston were analyzed to estimate background SO_2 concentrations (i.e., SO_2 concentrations not associated with the sources modeled). The background concentrations were then added to the modeled concentrations to project total ambient SO_2 concentrations.

To assess compliance with ambient air quality standards, total ambient SO_2 concentrations were projected for 3-hour, 24-hour, and annual averaging periods. A direct comparison was then made to ambient standards. Since the 24-hour ambient standard is a primary standard and was determined in this analysis to be more restrictive than the secondary 3-hour standard and the primary annual standard, the 24-hour standard was selected (with concurrence from DEQE and EPA) as the basis for compliance.

Highest projected total 24-hour SO_2 concentrations during coal firing are shown in Table 7.1-10 and Table 7.1-11.

The projections in Table 7.1-10 are the highest 24-hour SO_2 concentrations expected within the primary study area, which is comprised of Boston, Milton, and Wellesley. The 24-hour SO_2 concentrations for the primary study area are more representative of ambient SO_2 concentrations associated with coal firing at New Boston and Mystic Stations since one or both stations are a significant contributor to the projected totals.

Table 7.1-11 presents the highest 24-hour SO_2 concentrations expected outside the primary study area, defined as all PSD triggered baseline areas beyond 12.4 miles of the New Boston and Mystic Stations but within the significant impact areas of the Mystic and New Boston Stations. As indicated by the entries in Table 7.1-11, the higher 24-hour SO_2 concentrations are expected outside the primary study area to the north of Boston. The analysis of the results indicate that SO_2 emissions from New Boston and Mystic Stations do not significantly contribute to these totals.

The 24-hour SO_2 standard is 365 ug/m^3, and the results clearly indicate that it will be maintained at all receptors by a wide margin during coal firing. Further analysis of the modeling results described in Appendix C indicates that the 24-hour standard would not be exceeded for coals with sulfur content up to 4.6 percent. In other words, the primary 24-hour standard would not be violated unless all five candidate units were firing coal with 24-hour average sulfur contents in excess of 4.6 percent.

To ensure compliance with the 3-hour SO_2 standard of 1300 ug/m^3, the modeling results were evaluated for highest possible 3-hour concentrations. The results of this evaluation are similar to the evaluation for the 24-hour standard. The 3-hour standard will also be maintained by a wide margin when firing coal with an average of 1.5 percent sulfur. The standard will not be violated as long as the 3-hour average sulfur content does not exceed 4.6 percent.

Expected annual averages were also projected in accordance with DEQE and EPA approved modeling protocol for the evaluation of 1.5 percent (30-day average) sulfur content coal firing at New Boston and Mystic Stations. Highest annual average concentrations (modeled sources plus monitored background) of approximately 60 ug/m^3 were projected to occur north of Boston at locations where Mystic and New Boston Stations would have small contributions. The highest projected annual average concentration for the Metropolitan Boston area, where each station is known to have a contribution, is 52.9 ug/m^3 (see

Table 7.1-12), indicating that air quality will be maintained within the 80 ug/m^3 annual SO_2 standard by a wide margin.

Compliance with PSD increments was also assessed. PSD increments define the amount of air quality deterioration allowable in "triggered" baseline areas, i.e., those areas where a major source or modification requiring a PSD permit has previously located, thereby setting the baseline date. Once the baseline date is established, new emission increases after the baseline date may consume PSD increments, as well as affect ambient standards. In areas where baseline concentrations are low (i.e., good air quality), the increments do not allow deterioration up to the ambient standard. In areas where baseline concentrations are relatively high, but below standards, the increment may not be fully available, making the ambient standard the limiting constraint. A full discussion of PSD increment consumption and PSD baseline issues is provided in Appendix C.

Recent information from DEQE and EPA indicates that PSD increment consumption must be assessed in Wellesley, Natick, North Andover, and Lawrence. The baselines within these jurisdictions were set in accordance with EPA and Massachusetts PSD regulations. Boston and Milton were previously considered PSD baseline areas; however, recent information from DEQE indicates that the PSD baseline is no longer set in either Boston or Milton because the PSD permit which set the baseline date in both jurisdictions has been rescinded.

The results of the SO_2 increment consumption assessment indicate that SO_2 emission increases from New Boston and Mystic Stations due to coal firing will not cause the PSD increments to be exceeded within any of the triggered baseline areas (see Table 7.1-13). The results in Appendix C also indicate that such emission increases will not cause PSD increment values to be exceeded even in those cities or towns within the significant impact zone of either station where the PSD baseline has not been set. In fact, in some areas increment will be created, indicating a net improvement in ambient SO_2 concentrations during coal-firing (see Appendix C).

In conclusion, New Boston Units 1 and 2 and Mystic Units 4, 5, and 6 can fire coal with a sulfur content of 1.5 percent (30-day average) without causing a violation of ambient air quality standards or PSD increments.

Total Suspended Particulates (TSP)

Conversion to coal at New Boston and Mystic Stations will result in a slight improvement in annual ground-level concentrations of TSP at all receptors. Improvements in the annual average concentrations will be 0.01 ug/m^3 or greater. This improvement occurs even though the maximum particulate emission rate during coal firing could increase to 0.08 lb/MBtu at both stations. This is due to the increased dispersion achieved through the use of the proposed taller chimney at each station.

Converting from oil to coal firing at New Boston and Mystic Stations is predicted to result in a maximum net increase in ambient levels of TSP of only 0.8 ug/m^3. Location of the maximum increase is Hancock Hill in Milton. Even conservatively assuming that this small net increase occurs throughout Metropolitan Boston, it will not cause any exceedance of either the 24-hour primary or secondary TSP standards, nor significantly contribute to concentrations in the nonattainment areas. In fact, it is even less than the concentration (1 ug/m^3) which EPA uses in determining whether or not a source has a significant impact on an area. The maximum impact only consumes 2 percent of the PSD increment of 37 ug/m^3 for Class II areas.

In conclusion, the predicted small increase in the short-term TSP concentration due to coal firing will not have a significant effect on ambient air quality in either the towns attaining TSP standards in the Metropolitan Boston Air Pollution Control District (MBAPCD), or those towns not attaining TSP standards (Lynn, Revere, Medford, Waltham, Cambridge, and Quincy). In addition, the maximum 24-hour PSD increment consumed by coal firing will be very small. There will be a net improvement in annual average TSP concentrations at all receptors.

Respirable Particulate Matter (RPM)

The impact of coal firing on ambient respirable particulate matter (RPM) concentrations is predicted to result in a net improvement. This is because the maximum combined net increase in RPM emissions in converting from oil to coal at New Boston and Mystic Stations is only 6 lb/hr. By comparison, the maximum net increase in TSP emissions at the two stations is approximately 416 lb/hr. As previously stated this is predicted to cause a maximum net increase in the 24-hour ambient concentration of only 0.8 ug/m^3 and a net improvement in the annual average ambient concentration of 0.01 ug/m^3. It follows then, that the negligible increase in RPM emissions (6 lb/hr), in conjunction with the better dispersion associated with the taller chimneys, will result in a net improvement in ambient RPM concentrations at virtually all receptors. RPM standards do not exist at the present time.

Nitrogen Dioxide (NO_2)

Despite an increase in NOx emissions during coal firing, the coal conversions are predicted to result in net improvement in annual average NO_2 concentrations at every receptor by at least 0.005 ug/m^3. This is due to increased dispersion of emissions associated with taller chimneys. The annual standard is the only federal or state NO_2 standard.

In addition to the annual standard, DEQE has established a 1-hour NO_2 guideline of 320 ug/m³ applicable to new or modified major sources of NOx. DEQE policy states that a major source of NOx must show it will not have a "significant net impact" on any potential hot spot at times when the total hourly NO_2 concentration at such hot spot is above 320 ug/m³ on more than 1 day per calendar year (DEQE 1980). The source must also not cause more than one exceedance per year of the 320 ug/m³ guideline at locations where background levels of NO_2 exist. The determination of a source's compliance with the 1-hour guideline is performed by selecting the day with the second highest 1-hour concentration. The day with the highest concentration (even though several hours on that day may exceed the guideline) is considered a single exceedance. Therefore, the second highest day is used for compliance testing.

Hot spots are those locations that are no more than 250 meters (820.2 feet) in radius and where ambient NO_2 concentrations exceed community background levels because of motor vehicle emissions. DEQE treats stationary source impacts at hot spot locations different from background sites because of the unique nature of the hot spot locations (i.e., high traffic volume). These locations include the monitoring sites at Kenmore Square and Callahan Tunnel.

DEQE has ruled that a "significant impact" of NO_2 is 32 ug/m³. Any stationary source causing a 1-hour net impact of less than 32 ug/m³ is exempt from the NO_2 policy for hot spot locations. However, the source must still ensure that it does not cause, with consideration of existing concentrations, two or more exceedances of the 320 ug/m³ guideline at community background locations.

As shown in Table 7.1-14, 1-hour concentrations due to the net impact of firing coal at New Boston and Mystic Stations are within the significant level at the two monitored hot spots. At the monitoring locations considered to represent community background concentrations (Bremen Street, Tufts University, and Watertown Square), the predicted maximum net impacts when added to the respective second highest monitored concentrations result in concentrations well within the 320 ug/m³ guideline. This approach is conservative because the likelihood of the highest modeled net change and second highest monitored concentration occurring on the same hour is remote.

The highest net increase in Metropolitan Boston is 63.4 ug/m³, predicted to occur at Northeastern University on Huntington Avenue. To ensure conservatism, it is assumed that the highest of the second highest background concentrations (exclusive of hot spot monitors) recorded in Metropolitan Boston (207 ug/m^3) occurs at Northeastern University. The combined maximum net increase and highest-second highest background concentration is approximately 270 ug/m^3, well within the 320 ug/m^3 guideline.

The analysis of maximum 1-hour NO_2 impacts for New Boston and Mystic Stations described above includes two conservative assumptions. First, the highest (as opposed to the second highest) modeled concentrations were added to background levels to determine net impact. Second, 100 percent of NOx emissions were assumed converted to NO_2. An adjustment to the predicted impact is allowed for NO_2 because not all the NOx is actually converted to NO_2. DEQE recognizes that a maximum 81 percent of NOx emissions actually converts to NO_2 (DEQE 1980). However, this credit is not taken in this analysis.

In conclusion, conversion to coal of the candidate units at New Boston and Mystic Stations is expected to result in an improvement in annual NO_2 concentrations, no significant 1-hour impact at the monitored hot spots, and a 1-hour community impact well within the ambient guideline.

Carbon Monoxide (CO)

Ambient concentrations of CO are expected to improve as a result of the coal conversions. CO emissions decrease by approximately 34 percent and 21 percent from New Boston and Mystic Stations, respectively. This decrease in emissions, in conjunction with the increased dispersion associated with the proposed taller chimneys, will ensure that CO impacts attributed to coal firing will assist in improving the ambient concentrations in Metropolitan Boston.

As described in Section 5.3, several cities and towns are not attaining CO standards, including Boston. This is due primarily to automobile emissions. Stationary sources are generally not considered major contributors to ground level CO concentrations. The SIP strategy in attaining the ambient standards in the nonattainment areas is primarily transportation related.

Volatile Organic Compounds (VOCs)

As discussed in Section 5.3, there is no ambient standard applicable to VOC. However, since VOC is an alleged precursor to ozone, and ozone is not emitted directly from the New Boston and Mystic Stations, a summary of VOC impacts due to the coal conversion is appropriate.

Conversion to coal is expected to result in an improvement in ambient concentrations of VOC because emissions of VOC will decrease from oil to coal firing (by 51 percent at New Boston Station and 42 percent at Mystic Station). An improvement in ambient levels of VOCs will contribute to an improvement in ambient ozone levels.

Lead (Pb)

Coal-firing at New Boston and Mystic Stations will result in a net improvement in overall ambient Pb concentrations in Metropolitan Boston. Specifically, it is estimated that an improvement in ambient concentrations of at least 0.0001 ug/m³ on a quarterly average basis can be attributed to the coal conversions.

The combined maximum 24-hour impacts of Pb from New Boston and Mystic Stations during coal firing is conservatively estimated to be 0.0018 ug/m³. Even assuming the maximum 24-hour Pb impact persisted for a 3-month period, the combined contribution to ambient background would only be 0.1 percent of the ambient Pb standard of 1.5 ug/m³ (quarterly average).

Fugitive Particulates

As described in Section 7.1.2.1, the estimated fugitive particulate emissions from operation of the New Boston Station is only 1.76 tons/year, or approximately 9.6 lb/day. The ambient air quality impact associated with this small emission rate is insignificant and, in all likelihood, undetectable beyond the plant boundaries.

7.1.2.3.2 Noncriteria Pollutants

Sulfates

Because most sulfates are in particulate form, they are subject to removal during proposed coal firing by the ESPs. In fact, combined maximum particulate sulfate emissions during coal firing at New Boston and Mystic Stations will be less than during current oil firing (see Section 7.1.2.1).

Ground-level concentrations of sulfate cannot be predicted accurately because ambient concentrations are in large part due to secondary sulfate aerosols, which are formed in the atmosphere through the oxidation of SO_2 gas to sulfate particulates. This atmospheric oxidation process is affected by solar radiation, temperature, humidity, and concentrations of other aerosols which may catalyze the reaction. Because this process is complicated and not fully understood, atmospheric dispersion modeling has not been successful in predicting ground-level sulfate concentrations from fuel burning installations.

Some researchers have attempted to predict the conversion of SO_2 to sulfate in the plume downwind of a stack, but could not relate these concentrations to ground level quantities. The in-plume conversion rate is grossly approximated to a rate of between 0.3 and 4 percent per hour (EPA 1980a). Therefore, it would take approximately 3 days for 20 to 94 percent of the in-plume SO_2 to convert to sulfate. Obviously, this prediction is subject to a high degree of uncertainty. Sulfate has been associated with acid precipitation, but the effects of sulfate on this phenomenom, if any, would generally occur tens, if not hundreds of miles downwind from the sources of SO_2 emissions (see Sections 5.8 and 7.1.2.4).

Trace Elements

A summary of the ambient impact analysis for 20 trace elements is shown in Table 7.1-15. Presented are the predicted maximum 24-hour and annual average concentrations due to coal firing at New Boston and Mystic Stations. In addition, the combined net increase or decrease in ambient levels that can be expected by converting both New Boston and Mystic Stations from oil to coal are shown. A comparison of the maximum impacts during coal firing can be made with existing ambient concentrations, where available.

Ambient concentrations of trace elements attributed to coal firing are lower than for existing oil firing for many elements. Specifically, 24-hour concentrations of 10 of the trace elements are predicted to decrease during coal firing, and annual average concentrations are predicted to decrease for 12 trace elements. For those elements experiencing a net increase in ambient concentrations, the increases will normally be only a small percentage of the existing background levels. The increases in ambient levels of aluminum (Al) and iron (Fe) reflect the concentrations of these elements in coal. The decreases in ambient concentrations of vanadium (V), sodium (Na), and copper (Cu) are indicative of the levels of these elements in residual oil. No ambient air quality standards exist for any of these trace elements.

Radionuclides

Predicted ambient concentrations of the radionuclides associated with coal firing from New Boston and Mystic Stations are found in Table 7.1-16. Even conservatively assuming that the maximum concentrations from each station occur simultaneously and at the same receptor, the maximum 24-hour and annual average concentrations are extremely low. Comparing the thorium-228 values in Table 7.1-16 with the monitored ambient concentrations in Table 5.3-15 reveals that New Boston and Mystic contributions to ambient levels are 1,000 to 10,000 times less than those already existing in the atmosphere as background.

Rn, another daughter product of both uranium and thorium, is also a radioactive emission from coal firing. However, Rn is a very short-lived nuclide (3.8 days for Rn-222 and 55 seconds for Rn-220), which subsequently decays into the radionuclides presented in Table 7.1-16. Because of the short-lived nature of Rn, the impacts due to coal-firing are insignificant and unimportant (EPA 1979b).

As stated in Section 7.1.2.1, the emission rates of radionuclides from the reserve coal pile are even less than the emission rate occurring from normal soil. Therefore, an impact assessment of radionuclides from the reserve coal pile is meaningless.

There are no ambient or emission standards for radionuclides applicable to coal burning. In April 1983, EPA made a determination that radionuclide emissions from coal-fired power plants are not significant enough to be regulated under the National Emission Standards for Hazardous Air Pollutants (NESHAP) program (48FR15076). This decision reflects the minimal radionuclide impact associated with coal burning.

Organics

Table 7.1-17 shows the results of the ambient impact analysis for three organic species: formaldehyde (HCHO), benzo(a)pyrene (BaP), and polycyclic organic matter (POM). Typical ambient background concentrations of HCHO, BaP, and POM are also provided (EPA 1979d, DOE 1981, Singh 1982). The estimated maximum 1-hour and annual average ground-level impacts of these organics are miniscule. Where comparison with typical ambient background concentrations is possible, it can be seen that the impacts are orders of magnitude below existing ambient concentrations. The impact assessment for HCHO, BaP, and POM is based on a limited emissions data base and represents an approximation.

As stated in Section 7.1.2.1 emissions of small amounts of organics (as POM) are possible from the reserve coal pile during instances of spontaneous combustion. However, because the possibility of spontaneous combustion is most infrequent and POM emissions are small, impacts will be negligible.

7.1.2.4 Local/Regional/National/International Effects of Acid Precipitation

The specific effects of the Mystic and New Boston Station coal conversions on the acidity of precipitation cannot be quantified with confidence because of overwhelming contributions from upwind sources. The factors involved in the transport and diffusion of emitted sulfur and nitrogen oxides, their transformation into sulfates and nitrates, and their subsequent deposition on the earth's surface are too varied and complex to realistically model; that is, no source/receptor relationships can be established at this point of scientific knowledge. Among the meteorological factors involved are wind speed, wind direction, and their variation with height; thermal and mechanical turbulence, vertical transport, temperature inversions, precipitation frequency and intensity, orographic and water body influences, temperature, and humidity. In addition to these meteorological factors, the chemical transformations and deposition mechanisms are not understood.

Despite the complexity of quantifying the specific effects of the increased SO_2 and NOx emissions of the coal conversion on the acidity of precipitation on any scale (local, regional, national, and international), it is possible to draw general conclusions by putting the issue into perspective relative to other sources of acid rain precursors.

On the local level, there is no proven correlation between local pollutant emissions and the acidity of precipitation. Keeping in mind that Mystic and New Boston Stations are located on the coast in a region of prevailing westerly winds, it is clear that much of their emissions will be carried out to sea. This is supported by the Boston wind rose information shown in Figures 5.2-2 through 5.2-6. In addition, the air quality analysis presented in Section 5.2 indicates that when the wind does not blow out to sea, the increase in pollutant emissions due to the coal conversions will have a minimal impact in terms of local ground-level concentrations compared to background levels. Therefore, no significant impact on the acidity of local precipitation is expected.

On a regional, national, and international level, the increased pollutant emissions due to the coal conversions will be a very small increment in comparison to the existing emissions. The incremental increase in SO_2 emissions from Mystic and New Boston Stations is estimated to be 90,795 tons per year in comparison with the 1.4 million tons per year emitted by the northeast states. This amounts to a 6 percent increase in the regional SO_2 emissions. Furthermore, the Mystic and New Boston incremental increase in SO_2 emissions is only 1.1 percent of the estimated 8,205,000 tons per year (1980) emitted from the six states in the prevailing upwind direction from Massachusetts, as shown in Table 7.1-18. Therefore, if long-range transport of air pollutants is indeed a significant contributor of acid rain precursors in the northeastern United States and eastern Canada, then the Mystic and New Boston contribution of acid rain precursors is expected to be very small.

Another consideration is the conservative impact assessment performed for 42 potential coal conversion projects in the U.S. Department of Energy's (DOE) Final Northeast Regional Environmental Impact Statement (DOE 1982). In this assessment, a long range transport model developed by Argonne National Laboratory was used to predict long-term sulfate deposition rates in the northeast as a result of coal conversion emissions. The results of this effort indicate a maximum of 3 to 4 percent increase in sulfate deposition in the New York City area, with a 1 to 2 percent increase in New England. Although confidence limits on the accuracy of the modeling results could not be estimated by DOE, it is expected from this conservative assessment, involving a total of 42 possible coal conversion projects, that the Mystic and New Boston coal conversions' contribution to increased sulfate deposition will be very small.

7.1.3 References

Brady, J.D. Particulate and SO_2 Removal With Wet Scrubbers. Andersen 2000, Inc. Atlanta. Chemical Engineering Progress. 1982.

Eisenbud, M. and Petrow, H.G. Radioactivity in the Atmospheric Effluents of Power Plants that Use Fossil Fuels. Science, Vol 144, April 1964.

John, W. et al. Trace Element Concentrations in Aerosols from the San Francisco Bay Area. Atmospheric Environment, Volume 1. 1973.

Massachusetts Department of Environmental Quality Engineering (DEQE). Final Decision after Rehearing. Re: MATEP Application 77-S1. November 24, 1980.

Oak Ridge National Laboratory (ORNL). Klein, D.H. et al. Pathways of Thirty-Seven Trace Elements Through Coal-Fired Power Plants. Environmental Science & Technology, Volume 9, No. 10, October 1975.

PEDCO. Krishnan, E.R. and Hellwig, G.V. Trace Emissions from Coal and Oil Combustion. Environmental Progress. November 1982.

Singh, H.B.; Salas, L.J.; and Stiks, T.E. Distribution of Selected Gaseous Organic Mutagens and Suspect Carcinogens, in Ambient Air. Environmental Science and Technology. Vol 16, No. 12. December 1982.

U.S. Department of Energy (DOE). The Northeast Regional Environmental Impact Study: Reference Document for the Health Effects of Air Pollution. Economic Regulatory Administration, Office of Fuels Conversion. Contract No. W-31-109-ENG-38. November 1981.

U.S. Department of Energy (DOE). Final Northeast Regional Environmental Impact Statement. The Potential Conversion of Forty-Two Power Plants from Oil to Coal or Alternate Fuels. Economic Regulatory Administration Office of Fuels Programs, DOE/EIS-0083-F. October 1982.

U.S. Environmental Protection Agency (EPA). Concentration and Size of Trace Metal Emissions from a Power Plant, A Steel Plant, and a Cotton Gin, Environmental Science & Technology, Vol. 9, No. 7, July 1975a.

U.S. Environmental Protection Agency (EPA). Compilation of Air Pollutant Emission Factors, AP-42, Section 3.1.5. Heavy-Duty Diesel Powered Vehicles. December 1975b.

U.S. Environmental Protection Agency (EPA). Compilation of Air Pollutant Emission Factors, Third Edition, AP-42, Supplement 8, 1977.

U.S. Environmental Protection Agency (EPA). Workshop Proceedings on Primary Sulfate Emissions from Combustion Sources, Volume 2. Battelle - Columbus Laboratories, Sulfur Oxide Measurements of Utility Power Plant Emissions. August 1978a.

U.S. Environmental Protection Agency (EPA). Preliminary Assessment of the Sources, Control and Population Exposure to Airborne Polycyclic Organic Matter as Indicated by Benzo(a)pyrene. May 1978b.

U.S. Environmental Protection Agency (EPA). Iron and Steel Plant Open Source Fugitive Emission Evaluation. EPA-600/2-79-103. May 1979a.

U.S. Environmental Protection Agency (EPA). Radiological Impact Caused by Emissions of Radionuclides into Air in the United States. EPA 520/7-79-006. August 1979b.

U.S. Environmental Protection Agency (EPA). Particulate Emission Factors Applicable to the Iron and Steel Industry. EPA-450/4-79-028. September 1979c.

U.S. Environmental Protection Agency (EPA). Santo Donato, Joseph et al. Health Assessment Document for Polycyclic Organic. Matter Office of Health and Environmental Assessment. EPA-600/9-79-008. December 1979d.

U.S. Environmental Protection Agency (EPA). Characterization of Scrubbed and Unscrubbed Power Plant Plumes: Three Case Studies. EPA-600/7-80-070. March 1980a.

U.S. Environmental Protection Agency (EPA). Trace Metals and Stationary Conventional Combustion Processes: Volume 1. EPA 600/7-80-155a. August 1980b.

U.S. Environmental Protection Agency (EPA). Compilation of Air Pollutant Emission Factors, Third Edition, AP-42, Supplement 12. April 1981.

Environmental Research & Technology (ERT), Inc. Workbook on Estimation of Emissions and Dispersion Modeling for Fugitive Particulate Sources. September 1981.

TABLE 7.1-1

SUMMARY OF EMISSION RATES OF CRITERIA POLLUTANTS

Pollutant	Fuel	Emission Factor	Emission Rates (lb/hr)		
			Unit 1	Unit 2	Total
PM	Oil	0.034 lb/MBtu	119	119	238(3)
	Coal	0.08 lb/MBtu	259	259	518(3)
SO_2	Oil	1.0% Sulfur Content	3,709	3,709	7,418
	Coal	1.5% Sulfur Content	7,992	7,992	15,984
NOx	Oil	0.43 lb/MBtu	1,507.5	1,507.5	3,015
	Coal	0.80 lb/MBtu	2,590	2,590	5,180
CO	Oil	5 lb/10^3 gal oil	120.5	120.5	241
	Coal	0.60 lb/ton coal	80	80	160
VOC	Oil	0.8 lb/10^3 gal oil	19.5	19.5	39.0
	Coal	0.07 lb/ton coal	9.3	9.3	18.6
Pb	Oil	4.650×10^{-5} lb/MBtu(1)	0.1630	0.1630	0.3260
	Coal	(2)	0.1279	0.1279	0.2558

NOTES:

1. PEDCO. Krishnan, E.R. and Hellwig, G.V. Trace Emissions from Coal and Oil Combustion. Environmental Progress. November 1982.

2. Based on an average Pb concentration of 5.9 ppm of 23 eastern coals, assuming 96.8 percent of the Pb goes to fly ash and the remaining to bottom ash and a Pb collection efficiency of 91.6 percent by electrostatic precipitators. (U.S. Environmental Protection Agency (EPA). Trace Metals and Stationary Conventional Combustion Processes. Volume 1. EPA 600/7-80-155a. August 1980.)

3. Current maximum allowable PM emission rate per the SIP is 0.12 lb/MBtu, or 777 lb/hr.

TABLE 7.1-2

OIL AND COAL FLY ASH PARTICLE SIZE DISTRIBUTION

Size of Particles (diameter, um)	Oil Derived Fly Ash [1] (%)	Emission Rates(lb/hr) [2] Unit 1	Emission Rates(lb/hr) [2] Unit 2	Emission Rates(lb/hr) [2] Total
>30	15.0	18	18	36
20-30				
10-20				
5-10				
2.5-5	20.0	23.5	23.5	47
0-2.5	65.0	77.5	77.5	155
	Total	119	119	238

Size of Particles (diameter, um)	Coal Derived Fly Ash ESP Inlet(%)	Coal Derived Fly Ash ESP Outlet (%)	ESP Collection Efficiency (%)	Controlled Emission Rates(lb/hr) [2] Unit 1	Controlled Emission Rates(lb/hr) [2] Unit 2	Controlled Emission Rates(lb/hr) [2] Total
>30	22.5	5.0	99.9	13	13	26
20-30	20.0	6.0	99.9	16	16	32
10-20	34.5	17.5	99.8	45	45	90
5-10	16.0	19.5	99.6	50	50	100
2.5-5	3.0	17.0	98.3	44	44	88
0-2.5	4.0	35.0	97.4	91	91	182
			Total	259	259	518

NOTES:

1. No flue gas particulate control equipment
2. Particulate matter emission rates. Respirable particulate matter is that fraction of particulate with a diameter less than 2.5 um.

TABLE 7.1-3

COAL STORAGE AND HANDLING SYSTEM FUGITIVE DUST EMISSIONS

Source	Uncontrolled Emission Factor(1,2) (lb PM/ton coal)	Uncontrolled Emissions (tons PM/yr)	Control Efficiency (%)	Controlled Emissions (tons PM/yr)
1 Transfer	0.0010	1.168	75	0.292
2 Transfer	0.0030	3.503	99	0.035
3 Transfer	0.0026	3.036	99	0.030
4 Transfer(3)	0.0026	3.036	99	0.030
5 Transfer	0.0004	0.467	99	0.005
6 Transfer	0.0015	1.752	99	0.018
7 Transfer	0.0003	0.350	99	0.004
8 Crusher	0.06	70.062	99	0.701
9 Transfer	0.0007	0.817	99	0.008
10 Transfer	0.0007	0.817	99	0.008
11 Transfer	0.0022	2.569	99	0.026
12 Wind erosion (inactive pile)	0.4951	60.402	99	0.604
Total		147.949		1.761(4)

Description of Transfer Sources(5)

1	Transfer on self-unloading vessel (not shown on flow diagram)
2	Conveyor boom of self-unloading vessel to waterfront conveyors
3	Waterfront conveyors to silo stockout conveyor
4	Silo stockout conveyor to storage silos (via silo transfer conveyors)
5	Storage silos to silo reclaim conveyor
6	Silo reclaim conveyor to plant reclaim conveyor
7	Plant reclaim conveyor to crushers
9	Conveyor from crushers to plant reclaim conveyors
10	Plant reclaim conveyors to bunker tripper conveyors
11	Bunker tripper conveyors to bunkers

Description of Control Strategies

- All transfers are enclosed and equipped with a dust collection system, except for source 1 which is partially enclosed.

- All conveyors are enclosed with the exception of the conveyor boom on the self-unloading vessel, silo emergency reclaim conveyor, and the radial stacker conveyor which are partially enclosed (covered).

- The crushers are enclosed and equipped with a dust collection system.

- The inactive storage pile will be grass covered, having a straw mulch base with an asphalt emulsion binder.

TABLE 7.1-3 (Cont)

NOTES:

1. Emission factor for transfers incorporates a variable for drop height.
2. U.S. Environmental Protection Agency (EPA) Iron and Steel Plant Open Source Fugitive Emission Evaluation. EPA-600/2-79-103. May 1979.

   U.S. Environmental Protection Agency (EPA). Particulate Emission Factors Applicable to the Iron and Steel Industry. EPA-450/4-79-028. September 1979.

   Environmental Research & Technology, Inc (ERT). Workbook on Estimation of Emissions and Dispersion Modeling for Fugitive Particulate Sources. September 1981.
3. Emission rate considers coal transfer to all three storage silos.
4. Excludes emissions from partially enclosed conveyor due to lack of reliable emission factors. No emissions are expected from enclosed conveyors.
5. Refer to Figure 6.2-7 for flow diagram.

TABLE 7.1-4

TRACE ELEMENT CONCENTRATIONS IN COAL, MASS PERCENTAGE IN FLUE GAS AND COLLECTION EFFICIENCY BY ESP

Trace Element	Concentration in Whole Coal[1] (ppm)	Mass Percentage In Flue Gas[2] (%)	Collection Efficiency by ESP[3] (%)
Aluminum, Al	1.7%	82.0	99.1
Antimony, Sb	1.6	97.3	96.0
Arsenic, As	25	99.0	99.1
Barium, Ba	200	84.4	99.1
Beryllium, Be	1.3	84.4	97.6
Cadmium, Cd	0.24	91.1	95.5
Chromium, Cr	20	89.3	85.6
Cobalt, Co	9.8	84.4	98.2
Copper, Cu	18	87.6	99.1
Fluorine, F	89	100.0	92.3
Iron, Fe	1.5%	80.6	98.6
Magnesium, Mg	0.06%	82.8	99.0
Manganese, Mn	18	86.3	98.6
Mercury, Hg	0.20	99.3	0.0
Molybdenum, Mo	4.6	91.6	89.2
Nickel, Ni	15	86.4	78.5
Selenium, Se	4.0	100.0	61.8
Sodium, Na	0.04%	73.5[4]	99.1[4]
Vanadium, V	38	84.9	92.2
Zinc, Zn	25	95.5	96.3

NOTES:

1. Average concentration of 23 samples of eastern coals (EPA 1980).

2. Based on partitioning levels between bottom ash and fly ash in the flue gas observed at two plants equipped with pulverized coal fired boilers (EPA 1980). Trace elements in flue gas take the gaseous and/or particulate form.

3. Trace metal collection efficiencies observed at a coal-fired power plant equipped with an ESP, with a measured overall particulate collection efficiency of 99.1 percent (EPA 1980). Therefore, it was assumed that no trace element collection efficiency would exceed 99.1 percent.

4. Oak Ridge National Laboratory (ORNL). Klein, D.H. et al. Pathways of Thirty-Seven Trace Elements Through Coal-Fired

Power Plants. Environmental Science & Technology, Volume 9, No. 10, October 1975.

TABLE 7.1-5

TRACE ELEMENT CONCENTRATIONS IN RESIDUAL OIL AND EMISSION FACTORS

Trace Element	Uncontrolled Emission Factor(1) (lb/MBtu)	Concentration in Residual Oil (ppm)
Antimony, Sb	(2)	0.12(3)
Arsenic, As	1.100×10^{-4}	(4)
Beryllium, Be	5.347×10^{-6}	(4)
Cadmium, Cd	1.670×10^{-4}	(4)
Chromium, Cr	6.650×10^{-5}	(4)
Copper, Cu	(2)	140(3)
Iron, Fe	(2)	10(3)
Magnesium, Mg	(2)	7(5)
Manganese, Mn	2.558×10^{-5}	(4)
Mercury, Hg	2.092×10^{-6}	(4)
Molybdenum, Mo	(2)	1.19(3)
Nickel, Ni	6.673×10^{-4}	(4)
Selenium, Se	2.348×10^{-5}	(4)
Sodium, Na	(2)	63(5)
Vanadium, V	35.247×10^{-4}	24(5,6)
Zinc, Zn	(2)	1.30

NOTES:

1. PEDCO. Krishnan, E.R. and Hellwig, G.V. Trace Emissions from Coal and Oil Combustion. Environmental Progress. November 1982.

2. Emission factors were unavailable.

3. Based on laboratory analysis of a typical residual oil.

4. Concentration data specific to the residual oil used at New Boston Station were unavailable.

5. Based on laboratory analysis of residual oil used at New Boston Station.

6. The emission estimate was based on a vanadium concentration of 24 ppm since this is specific to the residual oil used at New Boston Station, rather than the emission factor.

TABLE 7.1-6

ESTIMATED TRACE ELEMENT EMISSION RATES

Trace Element	Fuel	Emission Rates (lb/hr)		
		Unit 1	Unit 2	Total
Aluminum, Al	Oil	(1)	(1)	(1)
	Coal	33.45	33.45	66.90
Antimony, Sb	Oil	0.0222	0.0222	0.0445
	Coal	0.0166	0.0166	0.0332
Arsenic, As	Oil	0.3856	0.3856	0.7712
	Coal	0.0594	0.0594	0.1188
Barium, Ba	Oil	(1)	(1)	(1)
	Coal	0.4050	0.4050	0.8100
Beryllium, Be	Oil	0.0187	0.0187	0.0375
	Coal	0.0070	0.0070	0.0140
Cadmium, Cd	Oil	0.5854	0.5854	1.1709
	Coal	0.0026	0.0026	0.0052
Chromium, Cr	Oil	0.2331	0.2331	0.4662
	Coal	0.6857	0.6857	1.3714
Cobalt, Co	Oil	(1)	(1)	(1)
	Coal	0.0397	0.0397	0.0794
Copper, Cu	Oil	25.9625	26.9625	51.9251
	Coal	0.0378	0.0378	0.0756
Fluoride, F	Oil	(1)	(1)	(1)
	Coal	1.8270	1.8270	3.654
Iron, Fe	Oil	1.8544	1.8544	3.7089
	Coal	45.12	45.12	90.24
Magnesium, Mg	Oil	1.2981	1.2981	2.5963
	Coal	1.3245	1.3245	2.6490
Manganese, Mn	Oil	0.0896	0.0896	0.1793
	Coal	0.0580	0.0580	0.1160
Mercury, Hg	Oil	0.0073	0.0073	0.0147
	Coal	0.0529	0.0529	0.1058
Molybdenum, Mo	Oil	0.2207	0.2207	0.4414
	Coal	0.1213	0.1213	0.2426

TABLE 7.1-6 (Cont)

Trace Element	Fuel	Emission Rates (lb/hr)		
		Unit 1	Unit 2	Total
Nickel, Ni	Oil	2.3393	2.3393	4.6786
	Coal	0.7429	0.7429	1.4858
Selenium, Se	Oil	0.0823	0.0823	0.1646
	Coal	0.4074	0.4074	0.8148
Sodium, Na	Oil	11.6831	11.6831	23.3663
	Coal	0.7054	0.7054	1.4108
Vanadium, V	Oil	4.4507	4.4507	8.9014
	Coal	0.6709	0.6709	1.3418
Zinc, Zn	Oil	0.2411	0.2411	0.4822
	Coal	0.2355	0.2355	0.4710

NOTE:

1. Data to estimate emissions were unavailable.

TABLE 7.1-7

RADIONUCLIDE EMISSION FACTORS AND ESTIMATED EMISSIONS

Element(1)	Fuel	Emission Factor(2) (pCi/lb coal)	Emission Rates(3)(uCi/hr)		
			Unit 1	Unit 2	Total
Ra^{226}	Oil	95.3(4)	0.0115	0.0115	0.023
	Coal	367.4	0.980	0.980	1.960
Th^{228}	Oil	308.4(4)	0.0365	0.0365	0.073
	Coal	128.8	0.343	0.343	0.686
Ra^{228}	Oil	222.3(4)	0.0265	0.0265	0.053
Th^{227}	Coal	26.8	0.071	0.071	0.142
Th^{230}	Coal	391.9	1.045	1.045	2.090
Th^{232}	Coal	136.1	0.363	0.363	0.726
U^{234}	Coal	392.8	1.047	1.047	2.094
U^{235}	Coal	38.1	0.102	0.102	0.204
U^{238}	Coal	412.8	1.100	1.100	2.200
Pb^{210}	Coal	453.6	1.209	1.209	2.418
Pb^{214}	Coal	328.9	0.877	0.877	1.754
Po^{210}	Coal	308.4	0.822	0.822	1.644
Bi^{214}	Coal	306.2	0.816	0.816	1.632

NOTES:

1. Radium (Ra), Thorium (Th), Uranium (U), Lead (Pb), Polonium (Po), Bismuth (Bi)

2. Eisenbud, M. and Petrow, H.G. Radioactivity in the Atmospheric Effluents of Power Plants that Use Fossil Fuels. Science, Vol 144, April 1964.

   U.S. Environmental Protection Agency (EPA). Radiological Impact Caused by Emissions of Radionuclides into Air in the United States. EPA 520/7-79-006. August 1979.

3. Emission rates for coal assume 99 percent collection by electrostatic precipitators

4. Emission factor in pCi/lb fly ash in flue gas.

TABLE 7.1-8

ORGANIC EMISSION FACTORS AND ESTIMATED EMISSIONS

Organic Compound[(1)]	Fuel	Emission Factor[(2)] ($lb/10^{12}$ Btu)[(3)]	Emission Rates (lb/hr) Unit 1	Unit 2	Total
HCHO	Oil	25.1	0.0879	0.0879	0.1758
	Coal	137.9	0.4466	0.4466	0.8932
BaP	Oil	0.047	0.00016	0.00016	0.00033
	Coal	0.070	0.0002	0.0002	0.0004
POM	Oil	0.209	0.00075	0.00075	0.00015
	Coal	2.326(4)	0.0075	0.0075	0.0150

NOTES:

1. Formaldehyde (HCHO), Benzo(a)pyrene (BaP), Polycyclic organic matter (POM)

2. PEDCO. Krishnan, E.R. and Hellwig, G.V. Trace Emissions from Coal and Oil Combustion. Environmental Progress. November 1982. This source also discusses dioxin emissions; however, it is stated that more detailed research is needed to provide a reliable emission rate.

3. The emission factor is in $lb/10^{12}$ Btu as opposed to $lb/10^6$ elsewhere because of extremely small values in this case.

4. With control by electrostatic precipitators.

TABLE 7.1-9

CHIMNEY AND FLUE GAS PARAMETERS AND SO_2 EMISSION RATES FOR EXISTING OIL FIRING AND PROPOSED COAL FIRING AT NEW BOSTON AND MYSTIC STATIONS (1)

Station	Fuel	Unit	Chimney Height (m)	Flue Gas Temperature (°K)	Flue Gas Exit Velocity (m/sec)	Chimney Diameter (m)	SO_2 Emission Rate (g/sec)	
							Max	Annual
Mystic	1% S oil	4	102.1	397.0	22.5	3.2	185.19	159.38
	1% S oil	5	102.1	396.3	21.9	3.2	181.11	154.92
	1% S oil	6	102.1	395.6	22.4	3.2	185.19	173.99
New Boston	1% S oil	1 and 2	76.2	399.7	31.4	3.05	934.63	850.05
Mystic	1.5% S coal (3)	4, 5, and 6	152.4	400	35.7	5.54 (2)	1421.0	1421.0
New Boston	1.5% S coal (3)	1 and 2	113.4	400	35.4	6.08 (2)	2014.0	2014.0

NOTES:

1. Mystic Units 4 and 5 are each rated at 1500 MBtu/hr. Unit 6 is rated at 1565 MBtu/hr. New Boston Units 1 and 2 are each rated at 3238 MBtu/hr. See Appendix D for refined conceptual design changes.

2. These values represent the equivalent diameter, which is the diameter of a hypothetical chimney whose exit area is the total exit area for the actual number of flues.

3. 30-day average.

TABLE 7.1-10

HIGHEST 24-HOUR AVERAGE SO_2 CONCENTRATIONS PREDICTED IN THE PRIMARY PSD BASELINE AREA (1.5 PERCENT SULFUR CONTENT COAL)(1)

Year	Day	Receptor Location(2)	Concentration(3) (ug/m^3)	Category
1977	054	Boston/Brookline Bdy (Rcpt #082)	163.3	Highest
	287	Boston/Brookline Bdy (Rcpt #082)	159.3	Highest-Second Highest
1978	048	Boston Harbor (Rcpt #057)	169.6	Highest
	048	Boston Harbor (Rcpt #037)	164.2	Highest-Second Highest
1979	050	Milton, Great Blue Hill (Rcpt #001)	194.3	Highest
	057	Boston, Hyde Park (Rcpt #005)	154.2	Highest-Second Highest
1980	015	Milton, Hancock Hill (Rcpt #002)	193.0	Highest
	016	Milton, Hancock Hill (Rcpt #002)	183.1(4)	Highest-Second Highest
1981	015	Milton (Rcpt #008)	198.7	Highest
	015	Boston Harbor (Rcpt #076)	165.1	Highest-Second Highest

NOTES:

1. 30-day average.

2. See Appendix C for coordinates of receptors.

3. 24-hour SO_2 ambient standard is 365 ug/m^3

4. Highest-second-highest concentration for the 5-year meteorological period for receptors within the primary PSD baseline area. This day, receptor, and concentration are also the limiting case for the complying fuel calculation for both Mystic and New Boston Station

Rcpt = Receptor

Bdy = Boundary

TABLE 7.1-11

HIGHEST 24-HOUR AVERAGE SO_2 CONCENTRATIONS PREDICTED OUTSIDE THE PRIMARY PSD BASELINE AREA (1.5 Percent Sulfur Content Coal)(1)

Year	Day	Receptor Location(2)	Concentration(3) (ug/m³)	Category
1977	034	Beverly (Rcpt #275)	238.7	Highest
	069	Manchester (Rcpt #276)	231.2(4)	Highest-Second Highest
1978	195	Beverly (Rcpt #275)	236.4	Highest
	024	Beverly (Rcpt #275)	203.9	Highest-Second Highest
1979	060	Salem/Peabody Bdy (Rcpt #225)	263.2	Highest
	346	Beverly (Rcpt #275)	202.6	Highest-Second Highest
1980	353	Manchester (Rcpt #276)	276.1	Highest
	050	Beverly (Rcpt #275)	185.7	Highest-Second Highest
1981	015	Salem/Peabody Bdy (Rcpt #225)	247.5	Highest
	054	Salem/Peabody Bdy (Rcpt #225)	229.4	Highest-Second Highest

NOTES:

1. 30-day average.
2. See Appendix C for coordinates of receptors.
3. 24-hour SO_2 ambient standard is 365 ug/m³.
4. Highest-second highest concentration for the 5-year meteorological period for receptors outside of the primary PSD baseline area.

Rcpt = Receptor

Bdy = Boundary

TABLE 7.1-12

HIGHEST ANNUAL AVERAGE SO_2 CONCENTRATIONS PREDICTED IN THE PRIMARY PSD BASELINE AREA

Year	Receptor Location (1)	Source Contributions (ug/m^3) Modeled Sources	Source Contributions (ug/m^3) Monitored Background (2)	Total (ug/m^3) (3)
1977	Boston (Rcpt #135)	14 9	38.0	52 9
1978	Boston (Rcpt #132)	11 8	40.0	51 8
1979	Boston (Rcpt #135)	13.0	35 9	48 9
1980	Boston Harbor (Rcpt #038)	13.9	35.2	49.1
1981	Boston Harbor (Rcpt #057)	14 2	33.9	48 1

NOTES:

1. See Appendix C for coordinates of receptors.
2. Represents a regional annual average background concentration as it is the average of all hourly monitored values for that particular year.
3. Annual ambient standard is 80 ug/m^3

Rcpt = Receptor

TABLE 7.1-13

HIGHEST PREDICTED SO_2 INCREMENT CONSUMPTION ASSOCIATED WITH PROPOSED COAL CONVERSIONS[1]
(ug/m³)

	Highest Incremental Contribution from New Boston and Mystic Stations	Incremental Contribution from Other Sources	Total Projected Increment Consumption	PSD Increment
3-hour average				
N. Andover	74	42	116	512
Methuen	52	35	87	512
Lawrence	59	115	174	512
Natick	74	199	273	512
24-hour average				
N. Andover	18	19	37	91
Methuen	11	16	27	91
Lawrence	16	43	59	91
Natick	15	9	24	91
Annual Average				
N. Andover	0.5	1.8	2.3	20
Methuen	0.2	1.4	1.6	20
Lawrence	0.3	9.2	9.5	20
Natick	0.4	8.0	8.4	20

NOTE:

1. These are the highest projected levels of SO_2 increment consumption with a potential contribution from coal-fired Mystic and New Boston Stations.

TABLE 7.1-14

COMBINED NET CHANGE IN AMBIENT 1-HOUR NO_2 CONCENTRATIONS

(ug/m^3)

Monitored Hot Spots	Source Contribution	Background(2)	Total(3)
Kenmore Square	18.0(1)	NA	NA
Callahan Tunnel	18.6(1)	NA	NA
Background Monitoring Locations			
Bremen Street, East Boston	18.8	207	226
Tufts University, Medford	41.4	197	238
Victory Field, Watertown	29.0	182	211
Location of Maximum Net Increase			
Northeastern Univ. Boston	63.4(4)	207(5)	270

NOTES:

1. Less than significant level of 32 ug/m^3.
2. Second highest concentration from Table 5.3-6.
3. State 1-hour guideline is 320 ug/m^3.
4. Represents maximum 1-hour No_2 impact.
5. No ambient NO_2 data are available at Northeastern University. However, to ensure conservatism, the highest - second highest background concentration is assumed to occur at Northeastern University receptor.

NA - Not applicable to the analysis at the hot spot monitoring locations.

TABLE 7.1-15

SUMMARY OF AMBIENT IMPACT ANALYSIS OF TRACE ELEMENTS

Element	Ambient Background (1) (ng/m^3) 24-Hr	Ambient Background (1) (ng/m^3) Annual	Highest Concentrations Due to Coal Firing (ng/m^3) New Boston Station 24-Hr	New Boston Station Annual	Mystic Station 24-Hr	Mystic Station Annual	Combined Net Increase (Decrease) in Concentration (ng/m^3) (2) 24-Hr	Combined Net Increase Annual
Aluminum	1500	NA	328.00	12.66	155.55	11.28	405	22
Antimony	20	NA	0.16	<0.01	0.08	<0.01	(>0)	(0.05)
Arsenic	7.9	0.4 (3)	0.58	0.02	0.28	0.02	(>0)	(0.10)
Barium	490	18	3.98	0.16	1.88	0.14	5	0.30
Beryllium	0.37	0.30	0.07	<0.01	0.03	<0.01	(>0)	(0.01)
Cadmium	11.0	2.0	0.03	Negligible	0.01	Negligible	(>0)	(0.10)
Chromium	19	15	6.72	0.26	3.19	0.23	4.2	0.10
Cobalt	2.0	0.9	0.37	0.01	0.18	0.01	0.5	<0.05
Copper	240	219	0.39	0.01	0.18	0.01	(>0)	(4.4)
Fluoride	NA	NA	17.91	0.69	8.50	0.62	22.1	1.2
Iron	2300	1100	442.30	17.10	209.89	15.22	514	25.3
Magnesium	2000 (4)	NA	12.98	0.50	6.16	0.45	2.5	(0.10)
Manganese	81	28	0.57	0.02	0.27	0.02	(>0)	(0.05)
Mercury	3	NA	0.52	0.02	0.25	0.02	0.5	<0.05
Molybdenum	10	NA	1.19	<0.05	0.56	<0.05	(>0)	(0.05)
Nickel	55	19	7.28	0.28	3.45	0.25	(>0)	(0.30)
Selenium	4.4	0.8 (5)	3.99	0.15	1.89	0.14	3.5	0.10
Sodium	2340	NA	6.91	0.27	3.28	0.24	(>0)	(1.3)
Vanadium	270	79	6.58	0.25	3.12	0.23	(>0)	(2.3)
Zinc	2000	300	2.31	0.09	1.10	0.08	0.04	(0.05)

NOTES:

1. Highest background concentrations recorded since 1976 at the two sites listed in Table 5.3-14.

2. Net Change in ambient concentrations during coal firing as opposed to oil firing at both New Boston and Mystic Stations.

3. Monitored in the Northern Great Plains.

4. Monitored in San Francisco, CA (John, W. et al. Trace Element Concentrations in Aerosols from the San Francisco Bay Area. Atmospheric Environment, Volume 1. 1973.)

5. Monitored in Watertown, MA.

NA - Not Available

TABLE 7.1-16

AMBIENT RADIONUCLIDE CONCENTRATION FROM NEW BOSTON AND MYSTIC STATIONS

(pCi/m^3)

Radionuclide(1)	New Boston Station Units 1 and 2	Mystic Station Units 4, 5, and 6
U^{238}	9.2×10^{-7}	8.2×10^{-7}
U^{234}	8.7×10^{-7}	7.8×10^{-7}
Th^{230}	8.7×10^{-7}	7.8×10^{-7}
Ra^{226}	8.2×10^{-7}	7.3×10^{-7}
Pb^{214}	7.3×10^{-7}	6.5×10^{-7}
Bi^{214}	6.8×10^{-7}	6.1×10^{-7}
Pb^{210}	1.0×10^{-6}	9.0×10^{-7}
Po^{210}	6.9×10^{-7}	6.1×10^{-7}
U^{235}	8.5×10^{-8}	7.5×10^{-8}
Th^{227}	5.9×10^{-8}	5.3×10^{-8}
Th^{232}	3.0×10^{-7}	2.7×10^{-7}
Th^{228}	2.9×10^{-7}	2.6×10^{-7}

NOTE:

1. Uranium (U), Radium (Ra), Thorium (Th), Bismuth (Bi), Lead (Pb), Polonium (Po)

TABLE 7.1-17

SUMMARY OF AMBIENT IMPACT ANALYSIS OF ORGANICS

Organic Species	Typical Ambient Background Concentration (ng/m^3)	Highest Concentrations Due to Coal Firing (ng/m^3)			
		New Boston Station		Mystic Station	
		1-hr	Annual	1-hr	Annual
Formaldehyde (HCHO)	490 (1)	28.2	0.1688	13.2	0.1507
Benzo(a)pyrene (BaP)	0.5 (2)	0.0126	0.00008	0.0063	0.00007
Polycyclic Organic Matter (POM)	30 (3)	0.4740	0.0028	0.2222	0.0025

NOTES:

1. Typical ambient background concentration based on surface level measurements conducted around the globe at 40°N latitude. Singh, H.B.; Salas, L.J.; and Stiles, K.E. Distribution of Selected Gaseous Organic Mutagens and Suspect Carcinogens, in Ambient Air. Environmental Science and Technology. Vol 16, No. 12. December 1982.

2. Typical annual average background concentration in an urban environment measured in 1975. (U.S. Department of Energy (DOE). The Northeast Regional Environmental Impact Study: Reference Document for the Health Effects of Air Pollution. Economic Regulatory Administration, Office of Fuels Conversion. Contract No. W-31-109-ENG-38. November 1981.)

3. Background concentration of POM in the United States is not available. Value provided is the result of monitoring during 1975-1976 in Norway and reflects downwind concentrations from the industrialized areas of England, Scotland, and France (EPA 1979).

TABLE 7.1-18

SO_2 EMISSIONS (tons/year)

State	1977 (1,2)	1980 (3)	SO_2 Emitted Per MWH(8) Generated (lb)
Illinois	1,389,000	1,127,800	42.8
Indiana	1,454,000	1,536,500	46.9
Kentucky	1,392,000	983,100	52.4
Ohio	2,695,000	2,168,700	50.0
Pennsylvania	1,375,000	1,441,800	32.7
West Virginia	992,000	947,100	32.9
Total	9,297,000	8,205,000(4)	
Boston Edison	44,400(7)	44,400	10.4
Massachusetts		275,500(5)	
New England States		409,900)6)	
31 Eastern State Impact Area (Utilities Only)		16,011,400	

NOTES:

1. National Emissions Data System (NEDS)
2. Most recent data available for this calculation
3. Office of Technology Assessment (OTA) data
4. 51% of eastern utility SO_2 emissions
5. 1.7% of eastern utility SO_2 emissions
6. 2.6% of eastern utility SO_2 emissions
7. 0.27% of eastern utility SO_2 emissions
8. MWH = Megawatt Hour

7.2 NOISE IMPACTS

7.2.1 Construction Phase Noise Impacts

Noise impacts during the construction phase are evaluated in reference to the Regulations for the Control of Noise in the City of Boston. Section 4.1 of the Boston regulations restricts noise emitted from construction sites, as measured at the nearest residential property lines, to 75 dBA L($_{10}$) and 86 dBA L(max). Section 4.3 of the Boston regulations limits noise levels of all construction devices to a maximum of 86 dBA at 50 feet from the device, with the exception of emergency service. Section 4.4 of the Boston regulations specifically excludes impact devices, such as pile drivers and pneumatic tools, from the provisions of Sections 4.1 and 4.3. The Massachusetts Department of Environmental Quality Engineering (DEQE) air pollution regulation (310CMR7.10) contains guidelines prohibiting unnecessary noise emissions; however, after Boston Edison Company (BECO) consultation with DEQE, it has been determined that the City of Boston noise regulations take precident over DEQE noise regulations in assessing the noise impacts of New Boston Station.

Noise levels during the construction phase of the proposed New Boston Station coal conversion will comply with the City of Boston regulations for construction noise. Noise levels produced by daytime construction activities in the main plant area during construction of electrostatic precipitators and ductwork, and installation of fans and other equipment, will fall in the 45 to 70 dBA range at the nearest residential property lines 150 to 200 feet south of the BECO property line, and typically will be masked by daytime traffic and aircraft noise, as discussed in Section 5.7. Nighttime activities will be minimized and occur only during boiler modifications and during unit startup at the final stages of construction. Work in the boiler areas will be shielded from the community by new coal bunkers. During these stages, as well as in all others, all reasonable efforts will be taken to reduce equipment noise levels and to confine heavy construction activity to daytime hours. Various aspects of the construction phase noise impacts are detailed in the following sections.

7.2.1.1 Demolition

The demolition work includes several major structures at the New Boston Station site and some miscellaneous facilities located on the Massachusetts Bay Transportation Authority (MBTA) property. The demolition activities are discussed in Section 6.

Demolition activity is currently anticipated to occur during daytime hours only (7 am to 6 pm, as defined in the City of Boston noise code) over an estimated 3-month period at the beginning of the construction phase.

Demolition noise levels at the nearest residential areas south of the BECO and MBTA properties are expected to be between 55 and 70 dBA. This will represent a slight increase from typical existing daytime noise levels, but will not exceed the City of Boston noise code for construction noise levels. Demolition noise levels will decrease with distance from the site.

7.2.1.2 Traffic

Construction traffic will occur primarily during weekdays and will consist of commuting worker traffic and construction vehicles. Worker commuter traffic is expected to peak at a maximum of approximately 550 vehicles per day. Worker use of existing public transportation facilities and carpools will reduce this number of vehicles. Commuter vehicle parking will be located in the BECO construction parking area shown in Figure 6.2-3. Access to this parking area is via East First Street. Construction vehicles will enter and leave New Boston Station on Summer Street, as required, primarily during daytime hours. Due to large existing traffic volumes in the area, discussed in Sections 4.4 and 7.4.1.2, as compared to anticipated construction traffic volumes, no significant noise impact is expected.

7.2.1.3 Establishing the Reserve Coal Pile

The reserve coal pile will be shaped and compacted during the later stages of the construction phase to a final estimated storage capacity of 244,000 tons or approximately a 51-day supply. Coal will be delivered from a self-unloading vessel as discussed in Section 7.2.2.2. A radial stacker and coaldozers will be employed during reserve coal pile buildup. They will be operated during daytime hours only (7 am to 6 pm). The coaldozers will be equipped with mufflers and their noise level in the nearest residential areas is expected to be between 47 and 56 dBA depending on which part of the coal pile they are working on. These noise levels are similar to present daytime noise levels and will comply with the City of Boston noise code for construction noise. The coal pile stacker noise level is expected to be 40 to 45 dBA in the community. A dust suppression tractor will be utilized for water spraying during reserve coal pile buildup. It is not expected to create noise impacts since it will be quieter than the coaldozers. There will be no nighttime noise impact associated with the establishment of the reserve coal pile.

7.2.1.4 Working At Night

Noisy construction phase activities will be scheduled for daytime hours (7 am to 6 pm). These include heavy demolition work, earth moving, pile driving, concrete placement, and most steel erection. During the final stages of construction, boiler modifications will occur on a two shift basis. However, these activities are primarily inside the boiler, and any outside activities will be shielded from the community by new coal bunkers and are not expected to produce any significant nighttime noise in the community.

7.2.2 Operational Phase Noise Impacts

Operational phase noise impacts are evaluated in reference to the regulations for the control of noise in the City of Boston. Section 3 of the regulation outlines those daytime/nighttime dBA noise levels and octave band sound pressure levels which shall not be exceeded for each zoning district (residential, business, and industrial). As a general indicator, the proposed New Boston Station coal conversion will include noise mitigation measures to ensure that the station noise levels following conversion, measured at the nearest residential property lines following conversion, will comply with the City of Boston Regulations for Noise. These mitigation measures are discussed in Section 11.2.

In summary, station noise levels following conversion will be in compliance with the City of Boston noise code limits. Operational phase noise impacts are discussed in detail in the following sections.

7.2.2.1 Main Plant Area

Once the station modifications and noise controls associated with the coal conversion, as discussed in Section 11.2, have been completed, the noise emissions from the main plant area (including boiler and turbine buildings, precipitators, fans, ducts, and chimney) will not exceed the noise levels mandated in the City of Boston noise code of 50 dBA during the night and 60 dBA during the day at the nearest residential areas. These noise levels will decrease with increasing distance from the station.

7.2.2.2 Coal Unloading and Handling Area

Self-unloading vessels will deliver and unload coal approximately once a week at New Boston Station. The coal unloading operation is designed to unload 35,000 tons of coal at a rate of 4000 tons per hour, and thus a 9-hour unloading period will be required. These vessels will be silenced for coal delivery so as to be in compliance with the City of Boston noise regulations at all times at New Boston Station, and as such, the vessel noise levels during coal unloading at New Boston Station will be between 35 and 38 dBA in the nearest residential areas and will not increase overall station noise levels.

Coal handling noise includes noise from coal falling into hoppers and through chutes, coal conveying, coal stockout, and reclaim.

Hoppers, chutes, and conveyor systems will be modified to reduce noise, as described in Section 11.2.1.2, for 24-hour operation and will not result in any increase in the overall station noise level following conversion. This level is expected to be between 45 and 48 dBA at the nearest residential areas, approximately 150 to 200 feet south of the BECO property line. Normal coal stockout and reclaim from enclosed concrete active coal silos will not be audible in the community. The coal crushing noise will be controlled as described in Section 11.2.1.2, and will not result in an increase in the expected station noise level. Coal pulverizers located in the boiler rooms will not be audible in the community, as discussed in Section 11.2.9.

The open reserve coal pile will be built up and grass covered during the construction phase (see Section 7.2.1.3). During the operational phase, reserve coal reclaim and stockout will be required only in the very rare event of an interruption in coal deliveries. The major noise sources in that event would be the reserve coal pile radial stacker and coaldozer. The stacker noise will be controlled (see Section 11.2.1.2) and its use will not increase station noise levels. Coaldozer use for emergency reserve pile stockout, reclaim, and grooming operations will be limited to daytime hours and will not result in noise impacts at night. Daytime coaldozer operation noise levels are expected to be no greater than 55 to 58 dBA at the nearest residential areas, approximately 1200 feet away from typical coaldozer operating locations, and will comply with the City of Boston noise code.

7.2.2.3 Traffic

BECO employs about 110 workers in three shifts at New Boston Station. The operating staff is anticipated to increase by 47 employees following proposed coal conversion. However, no noticeable noise increases are expected from additional station personnel traffic. Daytime noise-producing activities may also include ash truck transport operations. Noise levels from these operations on BECO property would range from 50 to 58 dBA at the nearest residential areas, in compliance with the City of Boston daytime code level of 60 dBA (residential zones). Since trucking operations are scheduled for daytime hours only (7 am to 6 pm), there will be no noise impact from these operations at night. Offsite ash transportation is discussed in Section 8.2.1.4.

7.3 WATER IMPACTS

Construction and operation phase water impacts due to the proposed coal conversion of New Boston Station are discussed in Sections 7.3.1 and 7.3.2, respectively.

7.3.1 Construction Phase Water Impacts

7.3.1.1 Water Quality

Potential construction phase impacts on surface water and groundwater quality may be associated with construction area runoff and percolation, miscellaneous liquid wastes associated with construction activities, station outage period effects, reserve coal pile runoff, and dredging in the Reserved Channel. Potential dredging impacts are discussed in Section 7.3.1.4; other potential water impacts of construction are discussed in this section.

Construction activities such as surface grading and excavations will disturb surface areas onsite. This will increase the potential for soil erosion and subsequent sediment transport during periods of precipitation runoff or when excavation dewatering is required. A small amount of eroded soil which may not be retained within the disturbed areas may reach the Reserved Channel via overland runoff flow. Section 11.1.4 discusses erosion mitigation. Considering the flat topography of the site and the moderately permeable soil, runoff sediment loss is expected to be be minimal. It is anticipated that temporary small increases in turbidity and suspended solids concentrations from the nonpoint source area surface runoff may occur along the waterfront area during periods of heavy rainfall.

Increased percolation of water into the soils in the disturbed areas is also expected. No significant impact to groundwater quality is anticipated. There is no groundwater use in the New Boston Station area or in South Boston.

Sanitary wastes will be generated by construction personnel. The peak construction force will total approximately 700 people. Sanitary wastes will be collected in portable chemical toilets located within the construction area and removed for offsite disposal by a licensed contractor. Therefore, no impacts from sanitary wastes are expected.

Miscellaneous other liquid wastes will also be generated by construction activities. These include used solvents, used lubricating oils, chemical flushing agents, spill cleanup wastes, painting wastes, and concrete mixing drum washings. Contractors will be responsible for properly handling and disposing of their wastes offsite in an approved manner.

Changes in the treated wastewater discharge and in the thermal content of the once-through circulating water discharge will occur during the unit outages. As presented in Section 6.4, the outages for New Boston Station Units 1 and 2 will be of 8 months duration and will be staggered so that they do not occur at the same time. During these periods, the volume of the circulating water discharge and the heat rejected will be halved. This will reduce the extent of the thermal plume. Potential impacts on aquatic ecology from station discharges during construction are discussed in Section 7.3.1.5.

The station outages will also cause a reduction in station wastewater volumes. The wastewater treatment system will continue to treat station liquid wastes throughout the construction period. Minor modifications to the wastewater treatment system, discussed in Section 6.2.8, will not necessitate an interruption in station wastewater treatment. The reduced waste discharge volumes will result in decreased mass loadings of constituents, and effluent characteristics will continue to be within limitations imposed by the National Pollutant Discharge Elimination System (NPDES) permit (see Section 3.1.2). No impact on the Reserved Channel water quality is expected.

During the latter phase of construction, the reserve coal pile will be developed. This will not take place until the coal pile liner and runoff collection system is constructed and connected to the wastewater treatment system. Thus, there will be no impacts due to uncontrolled discharges of coal pile runoff or leachate.

7.3.1.2 Hydrology

Construction activities will only slightly change local surface drainage and sediment transport patterns, site floodplain delineation, and percolation rates into the groundwater system. No substantial impacts are anticipated.

Under existing conditions, site runoff flows overland into the Reserved Channel. The site is flat with large paved or otherwise impervious areas. Earth moving during construction will expose soil that is more susceptible to erosion. However, the flat topography and erosion control practices will minimize erosion.

At the K Street construction laydown and parking area, site grading and weed removal will slightly increase runoff velocity and volume. The impact is expected to be insignificant, and only a portion of the 8.6-acre area will experience change. There will be no impact on the Reserved Channel.

The maximum water depth that would occur on the Massachusetts Bay Transportation Authority (MBTA) property during a 100-year flood is about 2 feet (see Section 5.4 for the extent of the existing floodplain). Site grading and the construction of the reserve coal pile will result in some alteration of the 100-year floodplain on the MBTA property as discussed in Section 7.3.2.2. Construction activities will not impact the floodplain at offsite properties. The 100-year floodplain in the construction laydown and parking area will remain essentially unchanged since the construction activity there is minor. There is no change in the 100-year floodplain in the main station area.

As discussed in Section 5.5.1, the New Boston Station and MBTA sites are filled land comprised of soils that are moderately permeable. Construction in these areas will disrupt the existing impervious tar and compacted ground surfaces. Thus, there will be increased percolation of precipitation into the groundwater system. The groundwater elevation (see Section 5.5.1) is slightly above harbor level in the flat areas near the Reserved Channel and exhibits damped fluctuations induced by the Boston Harbor tides. The small contribution of infiltration flows will have little effect on the groundwater level which is primarily controlled by the harbor water level.

7.3.1.3 Waterway System

Construction material delivery will be made primarily by truck to either the station site or to the construction laydown area at the Boston Edison Company (BECO) owned K Street property. Therefore, impacts associated with the construction phase material delivery will not affect waterway traffic in the Reserved Channel.

Waterfront activities for the proposed conversion consist of the construction of pile supported breasting and mooring dolphins, coal surge bin platform, and dredging to increase the channel depth along the New Boston Station and MBTA property shorelines to 35 feet below mean low water (mlw) (see Section 7.3.1.4). New Boston Station is located toward the end of the Reserved Channel, a designated port area, as defined by the Massachusetts Department of Environmental Quality Engineering (DEQE) (310CMR9.24). Priority land use is given to maritime-dependent industrial uses over maritime-dependent nonindustrial uses. The construction of waterfront structures will occur shoreward of the U.S. Pierhead and Bulkhead Line and the Reserved Channel limit and will have little impact on waterway traffic.

The Reserved Channel is approximately 1500 feet west of the main shipping channel in Boston Harbor. The west end of the Reserved Channel terminates at Industrial Park Drive in the Boston Harbor Industrial Park, west of the Reserved Channel Summer Street Bridge. Currently, there is little recreational use of the Reserved Channel. However, plans exist for the development of a

Reserved Channel marina on a site west of Summer Street and north of East First Street.

7.3.1.4 Dredging in Reserved Channel

To provide a berthing basin for coal delivery vessels at the proposed New Boston Station waterfront facilities, it will be necessary to dredge approximately 25,000 cubic yards of bottom sediments from the Reserved Channel. Figures 7.3-1 through 7.3-3 illustrate the location and extent of dredging which is necessary to provide a berthing basin with a depth of 35 feet below mlw. This area is outside the limits of the Reserved Channel and, for the most part, is shoreward of the U.S. Pierhead and Bulkhead Line. The area within the channel limits is a designated 35-foot channel and recent bathymetry shows that, with the exception of a few areas, the controlling depth in the Reserved Channel is about 32 feet below mlw (see Figure 5.4-1).

A clamshell dredge will be utilized to remove the bottom sediments in the designated dredging area. The dredge material will be loaded into barges for transport to the U.S. Environmental Protection Agency (EPA) approved Massachusetts Bay Foul Area for ocean disposal (see Section 8.1.3). Dredging will take 1 to 2 months to complete and will most likely occur during the summer or fall of 1985. This activity will temporarily increase suspended and dissolved solids' concentrations and turbidity in the vicinity of the dredging operation. Dredged material will be temporarily suspended in the water column. Physical and chemical characteristics of the dredged material are presented in Section 8.1.3. Solid phase bioassay and bioaccumulation studies were performed to evaluate ecological impacts presented in Section 7.3.1.5.

Based on methods to be employed during dredging and disposal operations and the results of analyses performed, little impact, if any, is anticipated.

7.3.1.5 Aquatic Ecology

As discussed in Section 5.6.2, there is little information available on the aquatic ecology of the Reserved Channel. However, few construction activities related to the proposed coal conversion have the potential to effect aquatic life in the vicinity of New Boston Station. The sources of potential aquatic impact are the dredging and construction activities in the Reserved Channel.

Dredging will impact approximately 2 acres of benthic habitat and will displace any organisms contained therein. Fish and many of the larger invertebrates are able to avoid areas of active dredging and would move back into the area following cessation of construction activities. Similarly, organisms such as polychaete worms and mussels which could not avoid the dredging would be replaced by migration and colonization from outside the dredged area.

Removal of existing pilings and other structures will remove attached plants and animals. New pile-supported structures placed along the channel waterfront will provide substitute habitats.

Clamshell dredging will suspend some sediments, cause localized increases in suspended and dissolved solids, and bury some organisms near the dredged area. Results of the bioassay study performed to support the U.S. Army Corps of Engineers (COE) and DEQE permit applications (see Sections 3.1 and 3.2) indicate that the sediments are not toxic to benthic invertebrates for the standard bioassay exposure test period (Battelle 1983). Therefore, there is little potential for impact to resident organisms outside the dredged area from the temporary exposure to dredged sediments.

Considering the small area affected by these activities in relation to areas of similar aquatic habitat within the Reserved Channel and Boston Harbor, as well as the generally poor quality of the existing benthic community (low diversity and abundance, principally polychaete and tubified worms, as discussed in Section 5.6.2), the impact of dredging is insignificant.

Disposal of the dredged spoils at the Massachusetts Bay Foul Area will minimally affect aquatic life (see Section 8.1.3). Based on bioassay and bioaccumulation studies conducted in support of the ocean disposal COE permit application (Battelle 1983) little or no mortality would be expected. These studies concluded that there was some statistical indication of bioaccumulation of PCB and DDT. However, the levels accumulated were quite low (in the range of parts per billion). Since the Massachusetts Bay Foul Area already contains PCBs (Gilbert 1975) and possibly DDT, this would not appear to constitute an important impact source.

Section 7.3.1 describes the water quality impacts of construction on the Reserved Channel. Since there is no significant change anticipated in wastewater characteristics during construction, and since erosion control measures (see Section 11.1.4) will be utilized for precipitation runoff during construction, no significant impact to aquatic life from these sources is anticipated.

7.3.2 Operational Phase Water Impacts

7.3.2.1 Surface Water Quality

As discussed in Section 5.4, the Reserved Channel of Boston Harbor receives existing, and will receive future, permitted liquid effluents from New Boston Station. The locations of effluent outfalls are shown in Figure 3.1-1. The impact of future station effluents on surface water quality can be assessed by comparing predicted and existing effluent qualities and mass loadings, and by comparing effluent qualities with receiving water standards.

The existing wastewater treatment system will require only slight modification for the conversion, as discussed in Section 6.2.8, and is designed to control the concentrations of pollutants in station effluents to within state and federal limits.

The long-term average discharge of treated effluent to the Reserved Channel from the converted New Boston Station is estimated to be about 420 gallons per minute (gpm), an approximate 25 percent increase over the existing long-term average discharge flow rate of 340 gpm. This is primarily the result of coal pile runoff, ash truck washwater, and increased floor and equipment drainage.

Table 7.3-1 indicates the existing station wastewater treatment system NPDES permit discharge concentrations, actual average discharge concentrations, and mass loading at the average discharge flow rate. Table 7.3-2 presents the postconversion period anticipated effuent concentration limits and anticipated mass loadings at the predicted average discharge flow rate of 420 gpm.

Impacts due to postconversion station effluent releases will be mitigated by continued use of the Best Available Technology Economically Achievable (BATEA) for control of pollutants. The increase in effluent quantity will augment the mass loading of the constituents. However, effluent concentrations will be within the anticipated limits established in the NPDES permit modified for the coal conversion. The impact to receiving water quality for specific parameters for which effluent discharge limits are anticipated, and/or Class SC water quality criteria exist, is discussed below. There will be changes in the treated wastewater discharge. The volume will increase by approximately 25 percent and some constituent concentrations of this discharge will change. Overall, the quality of the discharge following conversion will be similar to that before conversion.

Temperature

Conversion of New Boston Station to coal-fired operation will not have a significant impact on circulating water discharge temperature or ambient temperatures in the Reserved Channel. Boiler modifications at Units 1 and 2, discussed in Section 6.2.5, will not significantly alter discharge temperature. The maximum temperature difference allowed between ambient Reserved Channel and circulating water system discharge temperatures is 25°F, as noted in the existing NPDES permit (see Section 3.1). A maximum discharge water temperature of 96°F also applies at New Boston Station. No change in this limitation is anticipated after conversion, and New Boston Station discharges will continue to comply. The amount of heat discharged is a function of the operating capacity factor which is predicted to change only slightly. Station capacity factors for 1980, 1981, and 1982 were 74, 60, and 69 percent, respectively. The anticipated combined annual capacity factor after conversion is 70 percent, and no significant change in discharge temperature is expected.

Dissolved Oxygen

The anticipated minimal change in station discharge water temperature after conversion will have no significant impact on ambient dissolved oxygen concentrations. No other station effluent is expected to impact ambient dissolved oxygen.

Oil and Grease

No increase in oil and grease concentrations in the Reserved Channel is anticipated due to the coal conversion. No substantial amount of oil and grease is presently discharged from New Boston Station. Discharges to the Reserved Channel will continue to comply with NPDES effluent limitations, and no impact to water quality is expected.

pH

The pH of the Reserved Channel will not be affected by postconversion New Boston Station effluents. The anticipated pH for the average discharge from the wastewater treatment system will be 7.0, and pH will be maintained within the NPDES limits of 6.0 to 9.0. The alkalinity of Boston Harbor and Reserved Channel waters is sufficient to buffer fluctuations in pH from New Boston Station effluents, as discussed in Section 5.4.

Trace Metals

Discharges of copper and iron are currently limited to values listed in Table 7.3-1. This table also shows the actual quality of effluents currently discharged for the listed trace metals. Postconversion period trace metals concentrations in station effluent are anticipated to be comparable to those presently discharged, as presented in Table 7.3-2. Conversion of New Boston Station from oil to coal-fired operation will alter the trace metal proportions in raw wastewater. Additionally, the coal quality and method of combustion and storage will impact the quantity and distribution of trace metals in the raw wastewater. The EPA has specified combined chemical treatment as BATEA for control of trace metals in power plant effluents regardless of fuel type. BATEA is a central component in the existing wastewater treatment system, and will continue to control trace metals in the postconversion period. In addition to reduction of the trace metal concentrations of nickel, zinc, iron, and copper, this chemical precipitation process will remove other trace metals present in raw wastewater, as limited by individual trace metal solubility at the pH treatment process.

The postconversion average and worst-case mass loadings for the wastewater treatment system effluent will increase by approximately 25 percent for all regulated constituents. However, extremely low mass loadings of trace metals in the wastewater treatment system effluent are expected. Regulation of the effluent quality will be based on concentration limits rather than mass loading limits and the wastewater effluent will be maintained within the NPDES concentration limits.

Bacterial Indicators of Pollution

The New Boston Station sanitary wastes are currently, and will continue to be, discharged to the city sewer system after conversion. The conversion will not impact existing bacterial pollution in the Reserved Channel or Boston Harbor.

Inorganic Nutrients

Liquid effluents from the converted station will not impact nutrient concentrations in the Reserved Channel. No limitations for inorganic nutrients, such as nitrogen and phosphorus, currently exist for New Boston Station, and none are anticipated after the conversion.

Nonfilterable or Total Suspended Solids (TSS)

No substantial change in the discharge concentration of TSS is expected due to the coal conversion. TSS concentrations are currently within effluent limitations, and will continue to be so after conversion.

Other Water Quality Constituents

There are no present or anticipated discharges of radioactive substances from New Boston Station to the Reserved Channel. Color and turbidity will not change substantially as a result of the station conversion. No aesthetically objectionable pollutants that settle or float currently constitute a part of the New Boston Station discharge, and none are anticipated after conversion.

A discussion of possible impacts on surface water quality from an increased potential for acid rain due to the coal conversion is presented in Section 7.3.2.4. Coal handling procedures, discussed in Section 11.2.1, are designed to minimize coal spillage, and no impact to Reserved Channel water quality is expected from this source.

Water Quality Impact Summary

Wastewater effluent pollutants listed will be controlled to within permit limits listed in Table 7.3-2. Actual long-term discharge concentrations are anticipated to be approximately those of the existing station effluent concentrations listed in Table 7.3-1. As a result of the station conversion to coal, the quantity of station wastewater will increase approximately 25 percent. The mass loading of these pollutants is anticipated to increase as a result of the conversion but the magnitude of pollutant mass loading will remain extremely small.

7.3.2.2 Hydrology

The proposed project will change some local surface drainage features and the 100-year floodplain. Under existing drainage conditions, precipitation onto the site percolates into the soil or runs off into the Reserved Channel.

Existing site drainage will be primarily affected by the reserve coal pile runoff collection system. Coal pile runoff will be intercepted by asphalt-lined ditches surrounding the coal pile and conveyed to coal pile runoff ponds. Coal pile runoff will be treated by the wastewater treatment system before it is discharged into the Reserved Channel. Surface drainage from the remainder of the MBTA and New Boston Station properties will continue to flow to the Reserved Channel. The runoff from the site will have no effect on flow rates and water elevations in the tidal-dominated Reserved Channel.

The 100-year floodplain will be moderately altered in the coal pile area. Changes in all other areas will be negligible, as discussed in Section 7.3.1.2. Figure 7.3-4 illustrates the existing and altered floodplains at the MBTA property. The floodplain under proposed conditions will extend landward to a proposed access road around the coal pile perimeter. The proposed road will be elevated to prevent inundation of the coal pile during a 100-year flood event. The proposed coal pile runoff ponds will be built within a raised berm that will be higher than the 100-year flood elevation. Other proposed facilities in the floodplain on the MBTA property are breasting and mooring dolphins, the transfer and sampling house, and the coal surge bin. The only structure in the floodplain on the New Boston Station property will be a mooring dolphin. The 100-year flood elevation (10.3 feet National Geodetic Vertical Datum) is controlled by the Boston Harbor water level. Alteration of the 100-year floodplain on the MBTA property will not impact the 100-year floodplain at offsite properties.

7.3.2.3 Groundwater Quality and Hydrology

There is no use of groundwater by the existing New Boston Station, and none is planned for the station after conversion. There is no known use of groundwater in South Boston. As discussed in Section 5.5, groundwater monitoring at the site has indicated that the groundwater gradient is toward the Reserved Channel, and groundwater levels are affected by tidal fluctuations.

Operational impacts to groundwater quality due to potential leakage from coal pile runoff ditches and ponds, the coal pile liner, and wastewater treatment ponds will be minimal. The three existing wastewater treatment ponds are lined with Hypalon, a synthetic liner, and have not shown leakage since their installation in 1980. No modification to these ponds is anticipated for the coal conversion.

The coal pile and runoff ponds will be lined and the ponds will discharge to the wastewater treatment system. Any potential for leakage from this source will be further mitigated by the limited holding time for runoff. The reserve coal pile will be surrounded by a ditch system to convey runoff to the ponds. These ditches will be lined with asphalt and sloped, and will not provide a significant leakage source.

The reserve coal pile will be lined with 6 inches of a soil-bentonite mixture, with a permeability no greater than 10^{-7} cm/sec. The liner will extend to the ditch system, and will be cambered to facilitate drainage to the ditch system and to maintain a positive slope in the unlikely event of coal pile settlement. Perforated drain pipes and a 1-foot compacted sand and gravel layer will be installed immediately above the liner. Thus, a relatively small hydraulic head is anticipated on the liner, and no significant leakage is anticipated. The drains and sand and gravel layer decrease the residence time of water in the coal pile, thus reducing the concentration of dissolved solids in the coal pile runoff.

Construction of the coal pile should not affect groundwater hydrology at the site. The MBTA property upon which the coal pile will be placed is presently covered with asphalt pavement. The coal pile and ponds, which will be incorportated into this area, are lined and there will be no significant change in groundwater recharge.

The Groundwater Protection Strategy document, promulgated by the DEQE in January 1983, details concerns with the quality of groundwater supplies in Massachusetts. Lining the coal pile and runoff ponds is not required by state or federal legislation, but will be done to minimize any potential for contamination of groundwater due to the coal conversion of New Boston Station.

7.3.2.4 Aquatic Ecology Impacts

Sources of potential impact to the aquatic ecology of the Reserved Channel resulting from station operation after the coal conversion will be limited to cooling water intake and discharge, and to the treated wastewater discharge. These discharges will continue to be regulated by an NPDES permit issued jointly by the EPA and DEQE (see Section 3.1 and 3.2).

Cooling water usage following the conversion to coal will be essentially the same as usage prior to conversion. There will be no changes in the intake/discharge flow or velocity, the temperature rise across the condenser, or the discharge temperature. The annual capacity factor following the conversion is expected to be about 70 percent. Since this is within the range of capacity factors for the years from 1980 through 1982, and all other system parameters are similar, no change in impact potential from this source following the conversion to coal is anticipated.

No additional discharge outfalls will result from the coal conversion, except for emergency overflows from the coal pile runoff basins during periods of excessive rainfall (i.e., greater than 5 inches/day, the 10-year, 24-hour storm).

The increased volume of effluent from the treatment facility, while adding a greater mass loading of each constituent to the Reserved Channel, will be mixed, diluted, and dispersed through action of the adjacent larger circulating water discharge and through tidal flushing, in a manner similar to the existing effluent. The regulated average daily discharge volume of wastewater is 1 million gallons for wastewater and 500 million gallons for circulating water.

Additionally, concentrations for those constituents limited by the NPDES discharge permit will remain at or below present and anticipated permit limitations presented in Section 3.1. Impacts on water quality are discussed in Section 7.3.2.1. The discharge limitations expected for these constituents have been established for the protection and propagation of fish, other aquatic life, and wildlife (DEQE, Class SC waters). Maintaining present and anticipated regulated discharge concentrations should have no adverse impact on aquatic life in the Reserved Channel.

The treatment processes used to remove regulated constituents from the postconversion wastewater treatment discharge (see Sections 6.2.8 and 7.3.2.1) would also act to reduce concentrations of other nonregulated constituents. No quantitative assessment can be made of related impact potential of these nonregulated constituents, since postconversion concentrations cannot be predicted at this time. However, the control of discharge pH, combined with dilution and the natural buffering of sea water, act to further reduce the potential impact from this source since neutral to alkaline systems render many of the trace metals unavailable to aquatic biota (Dvorak et al 1978).

Changes in the pH of waterbodies can impact aquatic communities. As discussed in Section 5.8, it is not possible to quantify the acid deposition resulting from the conversion to coal-fired operation. However, based on prevailing wind patterns, most of the deposition would occur over the ocean. Since seawater is highly buffered, and thus resistant to pH changes (see Section 5.8), effects on marine life are unlikely.

Bodies of freshwater to the north and northeast of Boston (Coastal and Northern New England and Eastern Canada) could potentially receive trace amount of acidic deposition from the stations, as they do from any upwind source. However, neither the locations of deposition nor the extent of acidic contribution of the stations themselves can be determined at this time.

7.3.2.5 Waterway System

Operations with dock facilities on the Reserved Channel include Conley Marine Terminal at Castle Island, Texoco (White Fuel), Sea-Land Service, and the U.S. Army Base, currently leased to the Massachusetts Port Authority (Massport). It is estimated that 120 vessels per year enter the Reserved Channel bound for Conley Marine Terminal, Texaco (White Fuel), or Sea-Land Services (Halligan 1983). This total represents an average of 2.3 vessels per week.

Following conversion, vessels with an anticipated size of 655 feet in length, 95 feet in width and 34 feet in draft will deliver approximately 35,000 tons of coal weekly. These vessels will be unloaded over a 9- to 10-hour period into the coal surge bin. Coal vessel transport would add a small number of vessel trips to an already low level of use in the Reserved Channel. The maximum expected frequency of one vessel per week means an estimated 52 vessel trips in and out of the Reserved Channel annually. The total number of vessels entering the Port of Boston in 1980 was approximately 8200 (COE 1980). Approximately 70 percent of these trips were self-propelled vessels. Coal delivery transport to New Boston Station would represent an increase of approximately 1 percent in the number of self-propelled vessels in the Port of Boston and less than 1 percent in the total number of vessels.

7.3.3 References

Battelle. New England Marine Research Laboratory. Solid Phase Bioassey and Bioaccumulation Studies on Sediments from The Reserved Channel, Boston Harbor. April 18, 1983.

Dvorak, A.J. et al. Impacts of Coal Fired Power Plants on Fish, Wildlife and Their Habitats. USDI Fish and Wildlife Service (FWS/OBS-78/29).

Gilbert, T.R. Studies of the Massachusetts Bay Foul Area. Report No. 1-75. New England Aquarium. 1975.

Halligan, Joseph. Assistant Manager, Conley Marine Terminal, South Boston, MA and Ellis, C. Stone & Webster Engineering Corporation. Personal Communication. March 22, and March 29, 1983

TABLE 7.3-1

EXISTING NEW BOSTON STATION WASTEWATER TREATMENT SYSTEM EFFLUENT QUALITIES AND WORST-CASE MASS LOADING

Constituent	Average of Daily Concentration Limits for 30 Consecutive Days (1)	Actual Average Daily Concentrations (3)	Maximum Daily Concentration Limits (1)	Worst-Case Mass Loading at Average Discharge Rate (5)
pH (standard units)	6.5-8.5 (2)	7 (4)	6.5-8.5 (2)	Not Applicable
Oil and grease (mg/l)	10	1.0	15	28 kg/day
Iron (mg/l)	1.0	0.03	1.0	1.9 kg/day
Copper (mg/l)	1.0	0.40	1.0	1.9 kg/day
Nickel (mg/l)	Not regulated	0.02	Not regulated	Not regulated
Zinc (mg/l)	Not regulated	0.02	Not regulated	Not regulated
Total suspended solids (TSS) (mg/l)	30	30	100	185 kg/day

NOTES:

1. Base on current National Pollutant Discharge Elimination System (NPDES) limitations for New Boston Station (see Note 4).
2. Maximum range (see Note 4).
3. Based on concentrations as reported in New Boston Station Discharge Monitoring Reports of January 1982 to September 1982, filed with EPA and Massachusetts Division of Water Pollution Control.
4. Effluent pH is currently controlled to within 6.5 to 8.5, with a treatment objective of 7.0. Continuous pH monitoring over the report period indicated this objective was satisfied 97 percent of the time. For the renewed NPDES permit for oil-fired operation which is currently under EPA review, it is expected that these limits will expand to 6.0 to 9.0.
5. Based on the maximum daily concentration limits and the average discharge rate of 340 gpm.

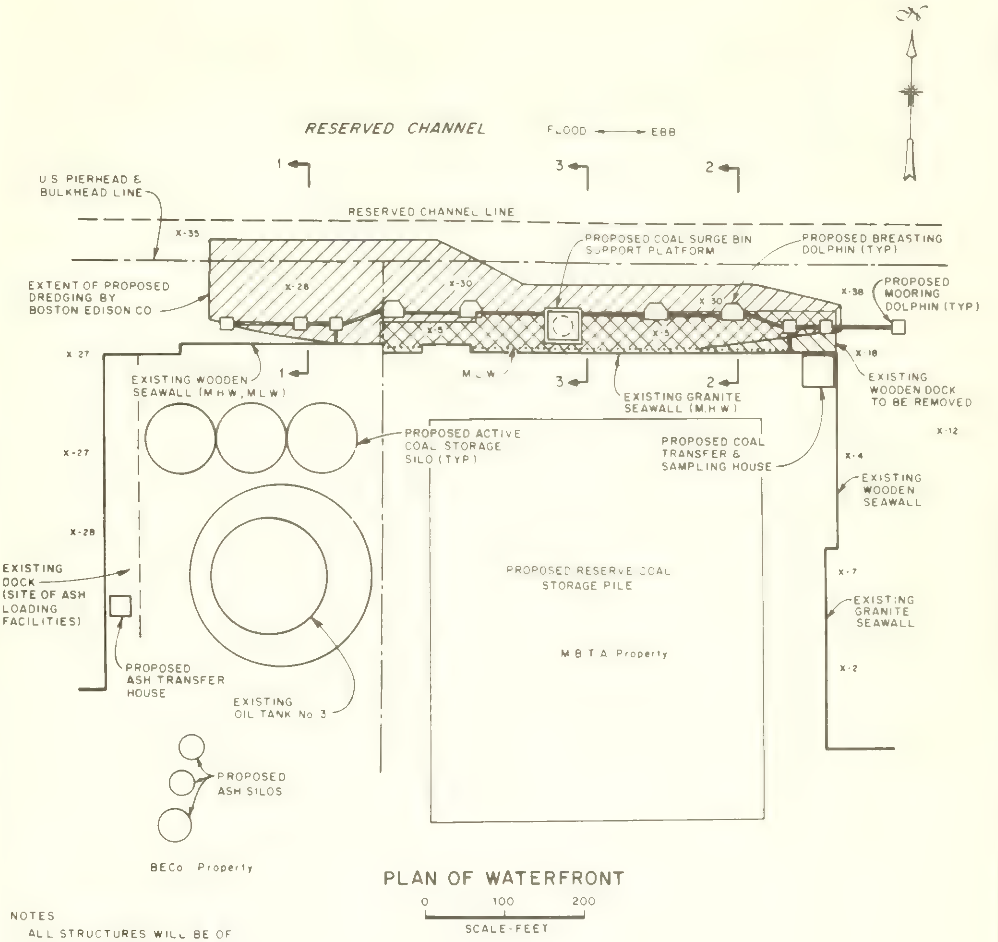
TABLE 7.3-2

POSTCONVERSION NEW BOSTON STATION WASTEWATER TREATMENT SYSTEM ANTICIPATED EFFLUENT LIMITS AND WORST-CASE MASS LOADING

Constituent	Average of Daily Concentration Limits for Consecutive Days(1)	Maximum Daily Concentration Limits(1)	Worst-Case Mass Loading at Average Discharge Rate(4)
pH (standard units)	6.0-9.0(2)	6.0-9.0(2)	Not Applicable
Oil and grease (mg/l)	10	15	35 kg/day
Iron (mg/l)	1.0	1.0	2.4 kg/day
Copper (mg/l)	1.0	1.0	2.4 kg/day
Nickel (mg/l)	1.0	2.0	4.8 kg/day
Zinc (mg/l)	1.0	2.0	4.8 kg/day
Total suspended solids (TSS) (mg/l)	30	100(3)	231 kg/day

NOTES:

1. Based on anticipated NPDES limitations for New Boston Station
2. Maximum range, based on a discussion with the EPA
3. Maximum at any one time
4. Based on the maximum daily concentration limits and the predicted average discharge rate of 420 gpm


RESERVED CHANNEL
FLOOD ← → EBB
1
3
2
U S PIERHEAD & BULKHEAD LINE
RESERVED CHANNEL LINE
X-35
X-28
X-30
X 30
X-38
X-5
X-5
X-18
X-27
X-27
X-28
X-12
X-4
X-7
X-2
PROPOSED COAL SURGE BIN SUPPORT PLATFORM
PROPOSED BREASTING DOLPHIN (TYP)
PROPOSED MOORING DOLPHIN (TYP)
EXTENT OF PROPOSED DREDGING BY BOSTON EDISON CO
EXISTING WOODEN SEAWALL (M H W, M L W)
M L W
EXISTING GRANITE SEAWALL (M H W)
EXISTING WOODEN DOCK TO BE REMOVED
PROPOSED ACTIVE COAL STORAGE SILO (TYP)
PROPOSED COAL TRANSFER & SAMPLING HOUSE
EXISTING WOODEN SEAWALL
PROPOSED RESERVE COAL STORAGE PILE
M B T A Property
EXISTING GRANITE SEAWALL
EXISTING DOCK (SITE OF ASH LOADING FACILITIES)
PROPOSED ASH TRANSFER HOUSE
EXISTING OIL TANK No 3
PROPOSED ASH SILOS
BECo Property
PLAN OF WATERFRONT
0
100
200
SCALE-FEET

NOTES

ALL STRUCTURES WILL BE OF OPEN PIER CONSTRUCTION
- a) MOORING DOLPHINS, (6) TOTAL
- b) BREASTING DOLPHINS, (4) TOTAL
- c) SUPPORT PLATFORM, (1) TOTAL

APPROXIMATELY 240 PILES (14" H-PILES) WILL BE DRIVEN:
- 120 - VERTICAL
- 120 - BATTER

APPROXIMATELY 25,000 CUBIC YARDS OF MATERIAL TO BE DREDGED TO ELEVATION -35 FT AND TO BE DEPOSITED OUT TO SEA IN THE FOUL AREA DISPOSAL SITE DREDGED MATERIAL CONSISTS OF SILTY CLAY AND ORGANIC SILT

DATUM IS MEAN LOW WATER

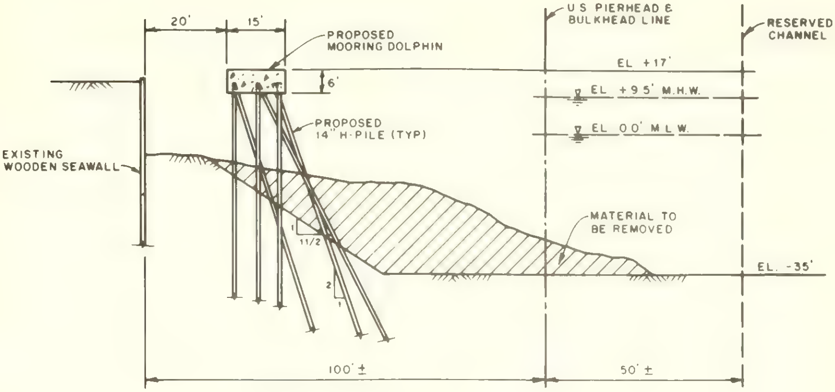
LEGEND

▨ AREA TO BE DREDGED

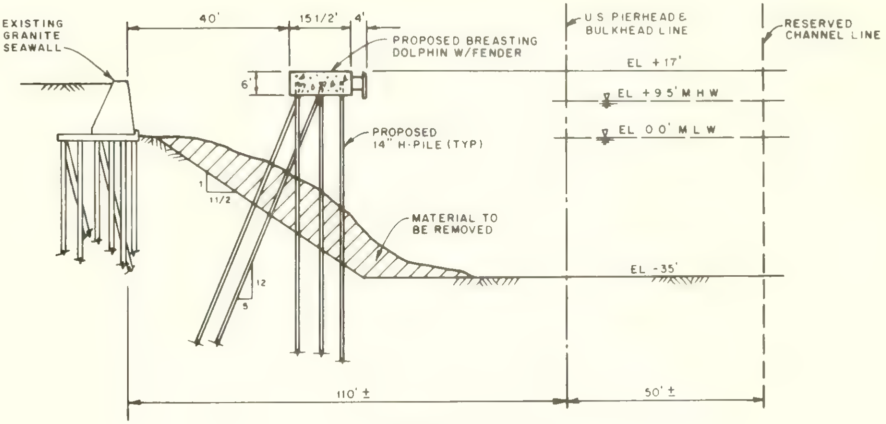
FIGURE 7.3-1

EXTENT OF DREDGING FOR WATERFRONT FACILITIES

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



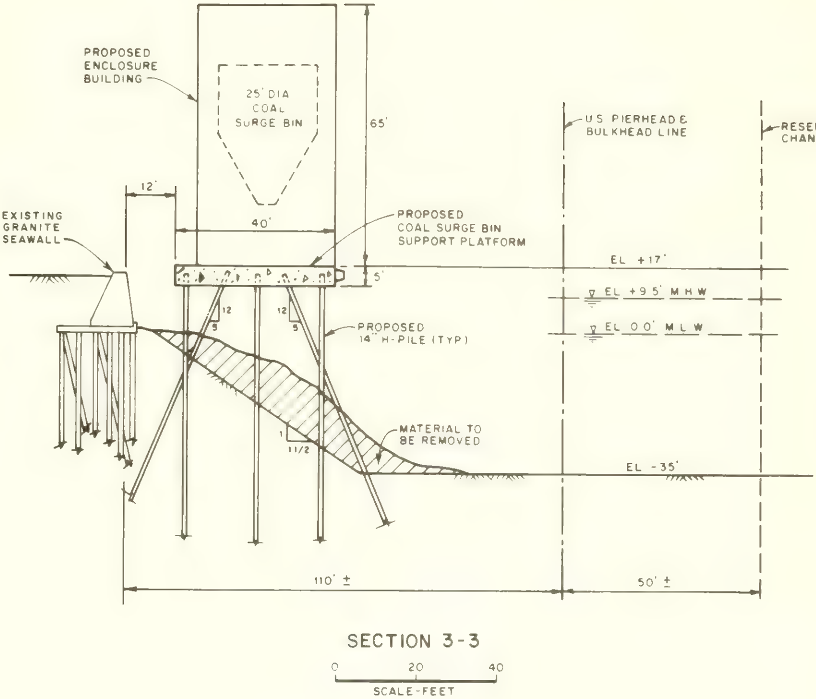
SECTION 1-1



SECTION 2-2

NOTE
DATUM IS MEAN LOW WATER

FIGURE 7.3-2
ELEVATION VIEW OF DREDGING
SECTIONS 1-1, 2-2
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTE
DATUM IS MEAN LOW WATER

FIGURE 7.3-3
ELEVATION VIEW OF DREDGING
SECTION 3-3
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

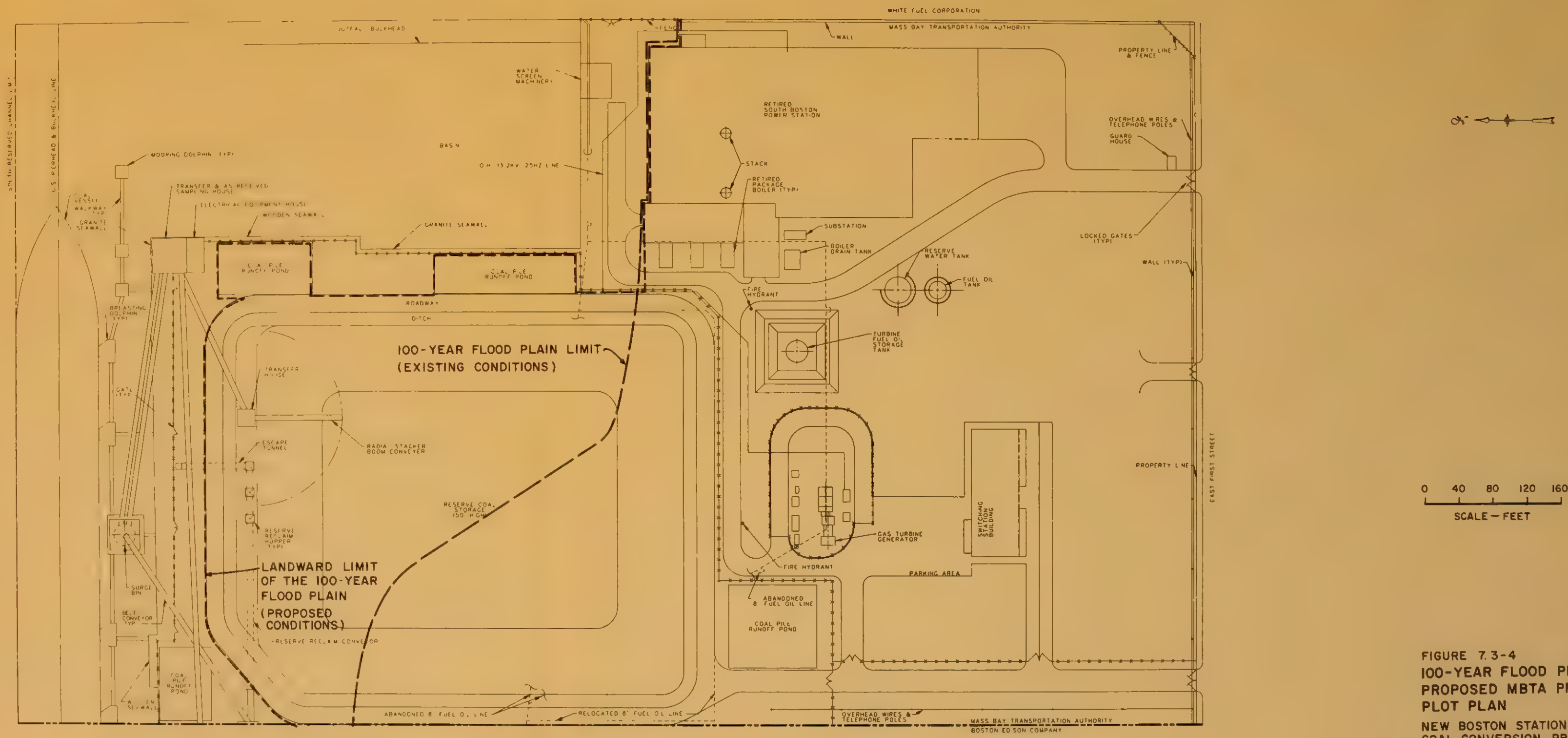


FIGURE 7.3-4
100-YEAR FLOOD PLAIN
PROPOSED MBTA PROPERTY
PLOT PLAN

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

7.4 LAND IMPACTS

7.4.1 Construction Phase Land Impacts

Potential land impacts during the construction phase, from January 1985 to June 1988, of the proposed coal conversion are associated with the site area activities, road traffic, construction laydown and parking, and terrestrial ecology.

7.4.1.1 Site Area

The New Boston Station site contains 24.2 acres of land. An additional 11 acres of adjoining Massachusetts Bay Transportation Authority (MBTA) land will be leased or the right to use it will be acquired from the MBTA for coal handling and reserve coal storage. An additional 8.6 acres of land, Boston Edison Company's (BECO) K Street property, will be used for construction laydown and parking. During the construction phase, land use within the proposed site boundaries will experience several changes due to activities associated with the demolition, relocation, and construction for the proposed coal conversion. These activities are not expected to extend outside the proposed site boundaries and are described in detail in Section 6. Offsite land use during the construction period is expected to remain the same as described in Section 4.2. No significant land use impacts are expected to occur.

7.4.1.2 Road Traffic

Potential road traffic impacts from the New Boston Station construction activities reflect the combined existing traffic and anticipated construction employee and contractor-related traffic volumes. Specifically, three factors are considered in assessing traffic impacts: vehicle trips generated during the construction period, traffic distribution, and New Boston Station site access roadway capacity.

Vehicle Trips

The number of automobile and truck trips to and from New Boston Station will increase as a result of construction activities. Automobile trips will be associated primarily with employees traveling to and from New Boston Station. Truck trips will result from the delivery of materials and equipment. Construction employee traffic to and from the station is estimated to average approximately 427 round trips daily. Peak construction employee traffic is estimated to equal approximately 520 daily round trips. The peak construction period is expected to be about 8 to 10 months in duration, lasting from about November 1986 to the summer of 1987.

These construction employee traffic volumes are considered to be conservatively high, as they do not reflect ridership on public transportation routes serving the New Boston Station site area. The MBTA currently operates four bus routes which stop within five blocks of New Boston Station. In addition, two MBTA Rapid Transit Stations are located in South Boston. They are the Broadway and Andrew Square Stations of the Red Line. Rapid transit and bus service provide direct access to the New Boston Station site area from the City and Greater Boston Communities. Section 11.1 provides service route descriptions, service schedules, and capacity ridership statistics for the public transportation modes most likely to be used by the construction workforce. It is estimated that approximately 25 percent of the construction personnel will use public transportation.

Incorporating public transportation ridership into construction-related vehicle trips, results in 320 average daily round trips and 390 peak daily round trips.

In addition to construction-generated automobile traffic, an increase in truck traffic will occur. The estimated number of daily truck trips will average 25 and peak at 50 per day. The mix of truck vehicles is expected to include 18 wheelers, low boys, delivery vans, and small trucks.

Traffic Distribution

Based on the location of New Boston Station with respect to areas inhabited by employees, contractor locations, and access points to South Boston from regional highways, it is expected that most traffic will approach the K Street construction parking area via East First Street. In addition, a significant portion of traffic will likely pass through the intersection of East First Street and Summer and L Streets. It is anticipated that the greatest impact on traffic will be found at this location and will consist of queuing and intermittent congestion during morning and evening rush hours.

Traffic associated with construction personnel is expected between the hours of 7:00-7:30 am and 4:00-4:30 pm Monday through Saturday, corresponding to the expected construction workweek at New Boston Station. Based on an estimated 25 percent of construction personnel using public transportation and based on a review of 1979 average daily vehicle trips along East First Street in the vicinity west of the station, an incremental 320 average daily round trips or 390 peak daily round trips translates into daily volume percentage increases of approximately 28 and 34 percent, respectively.

However, reviewing 7:00-7:30 am and 4:00-4:30 pm rush hour traffic counts at the East First Street and Summer and L Street intersection and conservatively assuming that all construction personnel traffic passes through this intersection, an incremental 320 average daily round trips represents approximately a 59 percent increase in morning rush hour traffic and approximately a 40 percent increase in evening rush hour traffic through this intersection.

Truck traffic is expected to arrive and depart between the hours of the scheduled workday, 7:30 am - 4:00 pm. Unloading will not normally occur after scheduled work hours. Trucks delivering materials and equipment will arrive at the construction laydown area or the New Boston Station site via East First Street, a segment of the existing designated truck route. Average daily truck trips of 25 and peak daily truck trips of 50 represent approximately 2 percent and 4 percent increases over 1979 truck volumes along a segment of East First Street between Old Colony Avenue and Farragut Road. Trucks are expected to arrive at the construction laydown area or the New Boston Station site full or partially full and leave empty.

Section 4.4 provides existing automobile and truck traffic distributions along major South Boston roadways and particularly along roads in the vicinity of New Boston Station.

Station Access Roadway Capacity

The incremental traffic to and from New Boston Station during construction is likely to cause some intermittent traffic congestion along East First Street and at its intersection with Summer and L Streets. As construction activities intensify, queuing may result during rush hours creating short-term traffic congestion. The potential for traffic impacts is further evaluated by determining level of service designations. Table 7.4-1 presents level of service criteria for signalized intersections. The existing level of service at the intersection of East First Street and Summer and L Streets lies in the A-B range (A - no restriction on operating speed, free-flow; B - some traffic restrictions on operating speed, stable flow), as described in Section 4.4. Based on incremental volume increases of 59 percent in the morning rush hour and 40 percent in the evening rush hour due to 320 average daily round trips generated by construction employees, the level of service could decline to levels C-D which represent conditions of volume restrictions and some congestion. Although these increases impact the level of service for this intersection, the capacity utilization will remain under approximately 90 percent. In addition, declines in level of service for this intersection will likely be moderated by the promotion and adoption of carpooling and possible construction-related traffic dispersion to other access roads west of this intersection.

7.4.1.3 Construction Laydown and Parking

Construction laydown and parking associated with the proposed New Boston Station coal conversion will be located on the BECO-owned K Street property. Of the total 8.6 acres, up to 4.5 acres will be made available for construction parking during peak work force periods. Public transportation and carpooling can reduce parking needs by accommodating a number of construction personnel.

The remaining 4.1 acres of the vacant lot will be used as, and is of adequate size to accommodate, construction laydown. No offsite land-use impacts will be associated with construction parking and laydown.

7.4.1.4 Terrestrial Ecology

Construction activities associated with the coal conversion of New Boston Station will include clearing of vegetation; movement of personnel, equipment, and supplies; and generation of noise and fugitive dust. Since most activities will be confined to the already disturbed urban environment, construction will not have a significant impact on vegetation or wildlife in the area.

Clearing of Vegetation

With the exception of the coal pile and construction laydown and parking areas, no clearing of vegetation will be required at the site. Construction of the coal pile berms and runoff ponds will necessitate clearing a minimal amount of vegetation (invading grasses, forbs, and trees) and grading on MBTA property in the area between BECO's New Boston Station and the MBTA inlet. The strip of weed trees to be cleared for this effort is neither unique nor of significant commercial value. In addition, since the area currently supports few wildlife species, the displacement of fauna from the area will be minimal.

Additional laydown and parking facilities will be required during construction. About 8.6 acres in the BECO-owned K Street property will be utilized for this purpose. The existing vegetation (grasses and forbs) will be cleared, and the area graded and graveled as necessary to assure adequate drainage and erosion control during the construction period. The vegetation is not unique or of significant commercial value, and although some displacement of wildlife may occur, no long-term adverse effect is anticipated since the area currently supports few faunal species.

Overall, the effects of clearing vegetation during the conversion process will be minimal. Faunal species typical of disturbed areas (e.g., rodents and birds) will be unable to utilize the K Street property once construction has begun; however, construction is unlikely to adversely affect local populations of these species.

Construction Noise

Vertebrate species typically react to sudden or unfamiliar sounds with a short-term (fight or flight) reaction (DuFour 1980). They also have the ability to become accustomed, through a phenomenon known as habituation, to continuous noise such that these reactions no longer occur. In the case of New Boston Station, terrestrial biota which inhabit communities adjacent to the site (residential areas and parks) should not be directly affected by the noise from construction activities onsite. As stated in Section 5.7, ambient daytime L(90) noise levels range from 50 to 60 dBA. The predicted daytime noise levels resulting from construction activities during conversion are expected to be similar, and should not result in any change in local faunal populations.

Fugitive Dust

At the New Boston Station site, dust generated as a result of construction activities (including demolition) will be mitigated by measures discussed in Section 11.1.3. Dust suppression techniques, the limited size of the project, and the temporary nature of the construction activities will minimize any detrimental effects of fugitive dust during construction.

7.4.2 Operational Phase Land Impacts

Potential land impacts during the operational phase of the coal conversion are associated with land use, road traffic and parking, terrestrial ecology, and the waterfront area usage.

7.4.2.1 Land Use

At the start of the operational phase, scheduled to begin for Unit 1 in October 1987 and for Unit 2 in June 1988, all construction activities previously discussed will be complete and in effect. After the construction labor force and its equipment and vehicles leave, the K Street construction parking and laydown area will be retained as parking and storage space. The MBTA portion of the station's site will experience the greatest change. Due to the addition of the reserve coal pile and the coal handling equipment, this portion of the station site will experience an increase in activity. Land use along the station's shoreline to the Reserved Channel will change from an unused docking platform to a vessel mooring area of open pier construction with coal receiving facilities. The reserve coal pile will not normally be in use. Finally, BECO is developing plans for the future construction of a fish pier, to be located adjacent to Summer Street along the Reserved Channel, and to be open for public use.

Offsite land use during the operational phase is expected to remain the same as described in Section 4.2.2. No significant land use impacts are associated with station operation.

7.4.2.2 Road Traffic and Parking

During the operational phase there will be a major reduction in station-related vehicular traffic volumes from those during the construction period. With the exception of a small increase in traffic due to the addition of an estimated 47 new operational employees and trucking for ash removal operations, traffic volumes will return to preconstruction levels. Supply delivery traffic will also return to preconstruction levels of approximately one truck per day, Mondays through Fridays. Offsite truck traffic for ash removal operations is discussed in Section 8.2.1.4.

Currently, onsite parking areas, including the K Street property, provide adequate space (approximately 160 parking spaces) for the operation and maintenance staff during normal station operation and overhaul periods.

7.4.2.3 Terrestrial Ecology

Coal firing at New Boston Station will result in few sources of potential impact to terrestrial biota. Factors to be considered include stack emissions, coal handling and storage, and noise. Overall impacts are minimal due to the limited flora and fauna in the area and the minimal nature of anticipated impacts.

Stack Emissions

New Boston Station, after conversion of Units 1 and 2 to coal, will continue to emit sulfur dioxide (SO_2), nitrogen oxides (NOx), and particulates to the atmosphere in compliance with emission requirements and National Ambient Air Quality Standards (NAAQS).

Effects of Sulfur Dioxide (SO_2) on Vegetation

The estimated maximum 3-hour SO_2 ambient concentration in the Metropolitan Boston area after the conversion to coal-firing of Mystic and New Boston Stations is expected to be less than a conservatively generated concentration of 546 ug/m^3. Although remaining well within the ambient standard, maximum short-term (3-hour) ground level SO_2 concentrations are expected to increase over existing levels. This increase, however, represents a very small potential for injury to vegetation, even SO_2-sensitive vegetation for the following reasons.

First, the estimated maximum 3-hour SO_2 value of 546 ug/m^3 (highest-second highest) monitored value in the Boston area over a 4-year period plus the highest-second highest prevention of significant deterioration (PSD) increment consumption predicted in the primary study area over a 5-year period) is a very conservative value due to the addition of two "highest" values without consideration of actual temporal and spatial occurrence. This value also represents less than half of the secondary ambient air quality standard (1300 ug/m^3), the intent of which is to protect public welfare, including vegetation. Second, the estimated 3-hour SO_2 value is at the low end of the dose injury curve (262 to 2620 ug/m^3) for sensitive species of vegetation for a 4-hour exposure (EPA 1973, Dvorak et al 1978). Third, since the existing 3-hour ambient background concentrations of SO_2 are above the threshold levels projected to cause injury to sensitive species of vegetation, vegetation now present in the area would be expected to be somewhat adapted to or tolerant of SO_2 exposure. Therefore, changes in composition or abundance of species of vegetation are unlikely to occur.

Effects of Sulfur Dioxide (SO_2) on Wildlife

Levels which have been shown to adversely affect vertebrates in laboratory studies generally far exceed the levels which would be produced by a state-of-the-art fossil-fueled facility. At New Boston Station, the incremental increase in SO_2 concentrations (both short term and long term) should not have a deleterious effect on wildlife.

Nitrogen Oxides (NOx)

Although NOx emissions will increase as a result of coal firing, the annual average NO_2 ambient concentrations will decrease due to better dispersion of stack emissions. Increases in the short-term (1-hour) NO_2 concentrations will occur in some instances. However, these are not expected to be deleterious to vegetation and wildlife because highest 1-hour ground-level concentrations which include a significant contribution from the coal conversion are generally an order of magnitude below the levels (2,000 ug/m^3) indicative of threshold injury to vegetation (see Table 7.1-14).

Total Suspended Particulates (TSP)

Conversion to coal at Mystic and New Boston Stations may result in a slight increase in particulate emission rates. However, the annual average ambient concentrations of total suspended particulates (TSP) will decrease slightly as a result of better dispersion through the taller stacks. The short-term (maximum 24-hour) concentrations of TSP will increase slightly at some receptors as a result of conversion. The contribution from the New Boston Station, however, is very small (2.5 ug/m^3) as compared to the background highest-second highest of 176 ug/m³. Thus, no adverse impact is anticipated as a result of coal firing.

Trace Elements

In addition to the emissions discussed above, the station will release trace elements in varying concentrations. As shown in Table 7.1-15, the most noteworthy changes in trace elements as a result of coal firing at Mystic and New Boston Stations are increases in the short-term (24-hour) concentrations of aluminum, iron, selenium, chromium, and cobalt since these elements are generally more abundant in coal than in oil. Although changes in these elements in some cases reflect increases over background levels, no adverse impact on terrestrial biota is expected because concentrations are very small (expressed in nanograms/m³); and in the presence of adequate rainfall such as received in this region, accumulation of these elements in the soil or root zone is unlikely to result in toxic levels.

Effects of Acid Precipitation on Terrestrial Ecosystems

As stated in Section 5.8, acid precipitation constitutes an existing environmental stress in portions of Northeastern United States. Although considerable controversy surrounds the acid deposition issue, studies have shown that long-term and short-term increases in acidity can be injurious to terrestrial systems (Dvorak et al 1978).

With respect to the effects of acid deposition on soils, the sensitivity of soils in the U.S. to acid precipitation has been studied (McFee 1980). The New England states contain large areas of slightly sensitive soils, interspersed with small areas of sensitive and non-sensitive soils (McFee 1980). Since most soils are only slightly sensitive to acid deposition, any contribution of Mystic and New Boston Stations to local acid deposition (see Section 7.1.2.4) should not have an adverse impact on the chemistry of soils in the area.

The potential effects of acid precipitation on vegetation are less precise. As discussed in Section 5.8, meteorological conditions will determine, to a large extent, the formation and dispersion of sulfates (precursors of acid precipitation) from Mystic and New Boston Stations. Under prevailing meteorological conditions, most SO_2 would be converted to sulfates many miles from the source (i.e., over the ocean). Thus, there would be no impact on terrestrial systems. However, under less frequent meteorological conditions which could occur at times during the summer months (Section 5.8), it is possible that some of the SO_2 could remain in the local area. Since it is not possible to quantify the amount or predict the location of potential impacts of acid precipitation attributable to New Boston and Mystic

Stations because of their small percentage of emissions compared to the effective background total emissions, no assessment of the effects on local terrestrial systems can be made at this time.

Coal Handling and Storage

Coal handling and storage could potentially affect terrestrial biota due to fugitive dust, waterfowl attraction to runoff collection ponds, vegetation damage due to coal pile leachate, and bird attraction to waterfront lighting during fog conditions.

Due to the effective dust collection and suppression systems installed onsite to control fugitive dust in the coal handling system (Section 11.2.1.3), no measurable impact on the limited vegetation in the area is expected.

Waterfowl in the area are not expected to be attracted to or utilize the coal pile runoff collection basins. These basins are relatively small and will be in an active industrial area, thus offering little attraction to waterfowl. Waterfowl utilizing the much larger Reserved Channel and areas within Boston Harbor are not expected to be adversely affected by the operation of New Boston Station.

The coal pile will be lined with an impervious clay liner and runoff and seepage will be collected and treated; thus, no impact to vegetation or wildlife from the coal pile runoff is likely to occur.

Floodlights associated with the waterfront facilities could serve to attract birds at night under poor weather conditions (e.g., fog). These birds could then become spatially disoriented and fly into structures. However, this lighting will not be particularly attractive to birds, because it will be a relatively low height source and will be among the numerous light sources that occur in the industrial area under similar conditions. The potential for bird mortalities attributable to the coal conversion will therefore be low.

Proposed landscaping and visual treatment plans (Section 11.2.6) include a grass covering on the reserve coal pile and the planting of trees in Independence Square and the adjacent Christopher Lee Playground. Trees used in the landscape plantings will be chosen based on screening value, wildlife value (food sources), good nesting and resting cover, and the ability to tolerate urban-residential environments.

Operational Noise

The postconversion New Boston Station will produce daytime noise levels at the nearest property boundary line less than those found prior to the initiation of the project. There will be no adverse impact due to noise on species which currently occur in the area.

7.4.2.4 Waterfront

The land use impact at the waterfront is the change from an unused docking platform to an area of active use for coal handling and storage.

During the operational phase, vessels with dimensions that are up to 655 feet long, 95 feet wide, and 34 feet in draft will deliver coal weekly. These vessels will be moored adjacent to the station waterfront structures comprised of support breasting and mooring dolphins, and concrete pile-supported platforms to support the coal receiving surge bin. Vessel unloading and coal receiving equipment located along the station waterfront will operate for 9 to 10 hours per delivery. Future construction of a fishing pier in the vicinity of the station inlet and discharge is planned and will be available for public use.

7.4.3 References

Dufour, P.A. Effects of Noise on Wildlife and Other Animals, Review of Research since 1971. USEPA, Office of Noise Abatement and Control, Washington, DC. July (EPA 550/9.80-100). 97 p. 1980.

Dvorak, A.J., Lewis, B.G., et al. Impacts of Coal-Fired Power Plants on Fish, Wildlife, and Their Habitats. USDI, FWS/OBS-78/29, 261 p. March 1978.

McFee, W.W. Sensitivity of Soil Regions to Acid Precipitation. USEPA, Environmental Research Lab, Office of Research and Development, Corvallis, Oregon (EPA-600/3-80-013). 186 p. 1980.

U.S. Environmental Protection Agency (EPA). Effects of Sulfur Oxides in the Atmosphere on Vegetation. Revised Chapter 5 for Air Quality Criteria for Sulfur Oxides, EPA-R3-73-030; PB-226-314. Nat. Environ. Res. Ctr., Res. Triangle Park, North Carolina, 43 p. 1973.

TABLE 7.4-1

LEVEL OF SERVICE (LOS) CRITERIA FOR SIGNALIZED INTERSECTIONS

LOS Designation	Description	Expected Operating Parameters	
		Typical Capacity Utilization (1)	Delay Range (2) (seconds per vehicle)
A	No restriction on operating speed, free-flow	0-60%	0-16.0
B	Some traffic restrictions on operating speed, stable flow	61-70%	16.1-22.0
C	Volume traffic restrictions on operating speed and maneuverability, stable flow	71-80%	22.1-28.0
D	Traffic congestion restrictions, unstable flow	81-90%	28.1-35.0
E	Traffic volume at or near capacity, unstable flow, stoppages	91-100%	35.1-40.0
F	Traffic volume above capacity, downstream restriction, forced flow	over 100%	over 40.0

NOTES:

1. Capacity utilization: traffic volume as a percent of intersection capacity.

2. Delay range: typical delay at intersection in seconds per vehicle, exclusive of signal.

SOURCES:

Highway Capacity Manual, 1968 Highway Research Board

"Transportation Research Circular Number 212. Interim Materials on Highway Capacity," Transportation Research Board, National Academy of Sciences, January 1980.

7.5 SOCIOECONOMIC IMPACTS

7.5.1 Construction Phase Socioeconomic Impacts

The current New Boston Station labor force consists of approximately 110 Boston Edison Company (BECO) employees. The peak and average contractor labor force during construction will be approximately 700 and 500 workers, respectively. The peak construction period will extend for approximately 8 to 10 months at a point two-thirds through the construction period. For a construction period of January 1985 to June 1988, the peak period is expected to begin in the winter of 1986 and continue through the summer of 1987. The majority of the construction labor force is expected to be drawn from the local Greater Boston area. However, due to housing availability and adequate public services, any additional population resulting from station labor settling in the local area will be absorbed without significant impacts.

7.5.2 Long-Term Socioeconomic Impacts

7.5.2.1 Property Values

The proposed coal conversion of New Boston Station will involve the addition of a limited number of structures on the existing station property and on a northern portion of Massachusetts Bay Transportation Authority (MBTA) property, the improvement of existing station features, and the demolition of some obsolete equipment associated with the retired L Street Station facility. The coal conversion will require a capital expenditure of approximately $500 million. Property taxes paid by BECO to the City of Boston will increase to reflect conversion additions. Therefore, the converted station will have little or no impact on property values of the surrounding housing stock. In 1982, property taxes for New Boston Station equaled $6,425,000, which represents approximately 1 to 2 percent of the City of Boston's 1982 total property tax revenues (Heanve 1982).

7.5.2.2 Economic Development of South Boston

Several development projects are either ongoing or planned in South Boston besides the New Boston Station proposed coal conversion. Development plans address transportation network improvements; seaport-related facilities expansion, renovation, and new construction; and commercial, industrial, and residential projects.

The following list identifies the major development projects in progress or planned for the South Boston area:

1. Transportation Network Improvements:

   a. Seaport Access Road Project - transportation planning project to develop and evaluate design alternatives, which provide direct truck access between the regional highway network and South Boston's seaport and industrial facilities.

   b. Northern Avenue and Summer Street Bridges Renovation/Reconstruction - program of ongoing repair work and reconstruction plans to upgrade bridges by increasing their load limits.

   c. South Station Transportation Center - redevelopment project to upgrade and expand mass transit facilities and service at South Station.

2. Seaport-Related Projects:

   a. Fish Pier Renovation - two-stage repair and renovation of the existing Fish Pier structure

   b. Boston Marine Industrial Park (BMIP) and Seaport Facility - ongoing development of BMIP facilities and intrastructure of the 101-acre park, including the reconstruction of two dry docks, designation of a foreign trade zone, and development of a job training center.

   c. U.S. Army Reservation/Garment Industry - Economic Development and Industrial Corporation (EDIC) sponsored development of the 43-acre complex and marginal wharf for the garment industry relocation.

   d. Conley Marine Terminal at Castle Island Expansion - development of an additional 10 acres by modifying and expanding terminal facilities to include an additional 1000 feet of marginal wharf space.

   e. Commonwealth Flats - 32.5-acre Massport proposed site development to provide a storage area for containers offloaded at the proposed seaport facility.

   f. U.S. Naval Recreation Area - proposed development of 15 surplus acres of the 20-acre recreational area for manufacturing and seaport-related activities.

3. Major Commercial, Industrial, and Residential Projects:

    a. Anthanas Pier 4 and Fan Piers 1, 2, and 3 - development of a 32-acre site to include a residential-commercial complex of high-rise housing, hotel, and office space; convention facilities, retail shops, parking spaces, and a marina.

    b. Town and City Properties Inc Project - proposed development of both commercial and residential projects along a 33-acre parcel parallel to Fort Point Channel.

    c. Commonwealth Pier/Boscom Project - renovation of Commonwealth Pier into a high technology exhibition and marketing center as well as restaurant and hotel space.

Additional capital improvements proposed or under consideration for the South Boston area include: a proposed development of general warehouse space west of the Reserved Channel by the Boston Harbor Industrial Development Corporation, a proposed MBTA maintenance facility and a Department of Public Works garage, both in the Fort Point Channel area. Finally, corporate investment plans by The Gillette Company and Texaco (White Fuel) Corporation include plant expansion and access improvement plans.

Figure 7.5-1 identifies and locates the development projects in the South Boston area and Table 7.5-1 provides available schedule and economic data for several major development projects in South Boston. Note that the proposed New Boston Station coal conversion contributes between 31 and 53 percent of major capital development funds for projects in South Boston.

In 1980 Massachusetts enacted legislation which provides a method for Massachusetts electric utilities to finance coal conversion projects (MGL c.164 Section 946 1/2). This legislation, known as the Oil Conservation Adjustment (OCA), is intended to provide incentive for electric utilities to convert oil facilities to coal. It allows electric companies to charge an adjustment in rates between two-thirds and 100 percent of fuel cost savings over 7 or more years.

The constraints within this method of recovery are: the electric company must demonstrate a substantial probability of savings, adjustment must not exceed fuel cost savings, and costs of expanding generating capacity are not allowed. However, the benefits are significant increases in customer savings and immediate savings, unlike conventional recovery.

BECO believes that this concept can be effectively utilized to reduce the financial risk associated with coal conversion projects and accordingly reduce the capital costs of conversion. With an appropriate OCA Revenue Order from the Department of Public Utilities (DPU), project financing could be accomplished utilizing a combination of pollution control bonds and intermediate debt instruments for each unit converted. This would result in 100 percent debt financing. In addition, customer savings will be enhanced during the recovery period due to the lower money costs. Proceeds from the OCA clause would be used to pay interest and retire the bonds over the period of conversion cost recovery. The capital expenditures and capitalized interest costs during construction will not be added to rate base and therefore, BECO would not make any profits from the conversion. In each year after conversion, the excess of OCA revenues collected over interest and tax payments will be used to retire the outstanding debt.

The proposed BECO coal conversion program for New Boston Station Units 1 and 2 and Mystic Station Units 4, 5, and 6 will result in significant savings for Boston Edison customers of approximately $2.9 billion by the year 2000. Finally, the conversion will result in the addition of 47 operating employees. Therefore, the New Boston Station coal conversion contributes significantly and positively to the economic development of the South Boston area.

7.5.3 References

Heanve, Thomas. City of Boston Tax Assessors Office and K. Baraniak, Stone & Webster Engineering Corporation. Personal Communication. November 23, 1982.

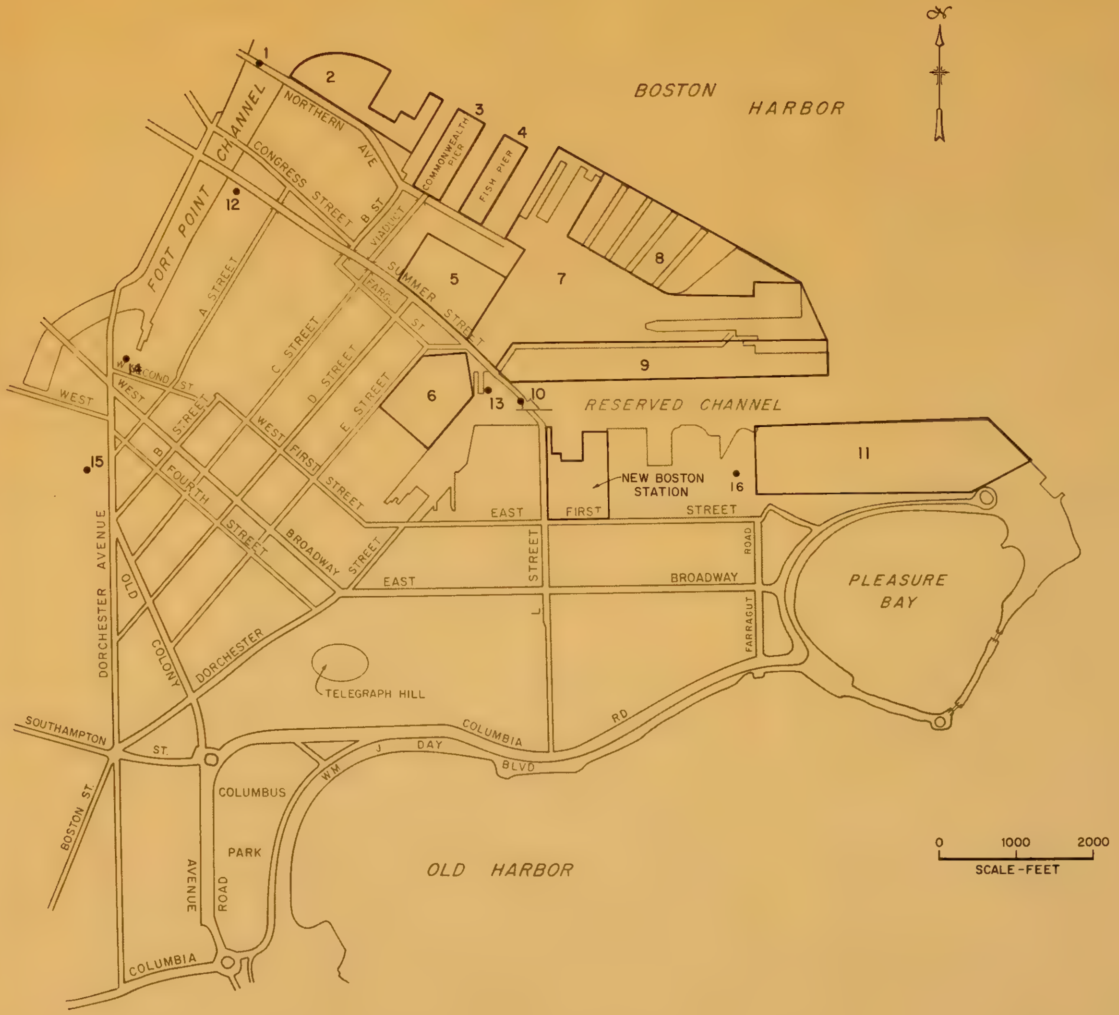
TABLE 7.5-1

MAJOR CAPITAL INVESTMENT DEVELOPMENTS IN SOUTH BOSTON

Development Project	Type of Development	Developer	Schedule Development	Estimated Cost of Development (millions)
Seaport Access Road	Transportation planning project	Boston Redevelopment Authority and Massport	1978-ongoing	NA
Northern Avenue Bridge Reconstruction	Ongoing repair and reconstruction project	City of Boston, Department of Public Works	1978-ongoing	$12
South Station Transportation Center	Redevelopment project to expand mass transit facilities and services	Massachusetts Bay Transportation Authority	1979-ongoing	$76
Fish Pier Renovation	Two-stage repair and renovation of existing structure	Massport	1978-ongoing	NA
BMIP and Seaport Facility	Ongoing development of industrial park facilities and development of marine terminal for container port operation	Massport	1983-1995	$60-$90
U.S. Army Reservation/ Garment Industry	Conversion of Army Base Building 114 to garment/ industrial users	Economic Development and Industrial Corporation/Boston	1982-1984	$30
Anthanas Pier 4 and Fan Piers 1, 2, 3	Phase development of residential-commercial high-rise, hotel, and office space, convention facilities, retail shops, parking, and marina	Anthony's Pier 4, Incorporated	1984-1992	$200
Commonwealth Pier/ Boscom Project	Renovation of Commonwealth Pier into a high-technology exhibition and marketing center, and hotel and restaurant space	FMR Properties, Incorporated	1983-ongoing	$85
New Boston Station Units 1 and 2 Coal Conversion	Conversion of electric generating Units 1 and 2 at New Boston Station from oil to coal	Boston Edison Company	1984-1988	$513

NOTE:

NA = not available



LEGEND

1. NORTHERN AVENUE BRIDGE
2. ANTHONY'S PIER 4 AND FAN PIERS 1-3
3. COMMONWEALTH PIER DEVELOPMENT - BOSCOM
4. FISH PIER RENOVATION
5. COMMONWEALTH FLATS
6. U.S. NAVAL RECREATION AREA
7. BOSTON MARINE INDUSTRIAL PARK
8. BOSTON SEAPORT DEVELOPMENT
9. GARMENT INDUSTRY - U.S. ARMY RESERVATION BUILDING 114
10. SUMMER STREET BRIDGE
11. CONLEY MARINE TERMINAL AT CASTLE ISLAND
12. TOWN & CITY PROPERTIES, INC. PROJECT PROPOSAL
13. BOSTON HARBOR INDUSTRIAL DEVELOPMENT CORP. PROJECT PROPOSAL
14. GILLETTE CAPITAL INVESTMENT PLAN
15. MBTA MAINTENANCE FACILITY PROPOSAL
16. TEXACO (WHITE FUEL)

FIGURE 7.5-1
PROPOSED AND ONGOING PROJECTS
IN SOUTH BOSTON
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

7.6 AESTHETIC IMPACT

7.6.1 Station Structures Impact

Boston Edison Company's (BECO) New Boston Station is located in South Boston along the southern bank of the Reserved Channel at an elevation of approximately 9 to 11 feet above mean sea level. The station is bounded by East First Street to the south, Summer Street to the west, and Massachusetts Bay Transportation Authority-owned property to the east. The existing New Boston Station consists of Units 1 and 2 electric power generating plants, which were completed in 1965 and 1967, respectively. Major onsite equipment and structures which are part of these units include turbine generators, boilerhouses, switchhouses, wastewater holding basins, offices, and electrical transformers. The site also includes the retired L Street Station facilities.

A brick wall runs along the southern and western perimeters of the existing New Boston Station and serves to separate and partially screen the station from nearby residences, from the Christopher Lee Playground, and from traffic traveling along East First Street. Figure 7.6-1 presents an aerial perspective of the New Boston Station site.

As fully discussed in Section 6, conversion of Units 1 and 2 from oil to coal-fired operation includes the following major activities:

1. Demolition of existing structures in certain areas to accommodate new precipitators, induced draft (ID) fans, chimney, and waterfront facilities for coal vessel unloading. This includes the removal of the four existing 250-foot steel stacks.

2. Construction of waterfront coal-handling facilities and ash-handling facilities.

3. Construction of active coal storage silos and stockout and reclaim conveyors, and construction of a lined 50-foot high grass-covered reserve coal pile and associated reclaim hoppers and conveyors.

4. Installation of electrostatic precipitators and ID fans, and construction of a new 369-foot double-flue chimney.

5. Construction of fly ash and bottom ash handling systems and associated storage silos.

7.6.2 Visual Impact

Construction associated with the proposed conversion of New Boston Station will cause a minimal change as viewed from surrounding areas. The extent to which the conversion's additions will be visible and dominant characteristics in the viewscape depends on the viewer's location and perspective, but can be generally described as limited and minimal beyond the immediately surrounding areas of South Boston.

A region inscribed by a 5-mile radius around New Boston Station was selected to serve as the study area. Researchers have concluded that an object or facility viewed from a distance beyond 5 miles can no longer be considered a significant feature in the total viewscape (Jones et al 1975). To determine the visual impact of the New Boston Station conversion within the study area, visual sensitivity, station viewshed, and change in visual quality were assessed. Line-of-site analysis, study area reconnaissance, and research were used to locate visually sensitive areas and to identify station viewshed. A computer program, Plant Plot, was used to analyze compatibility and change in visual quality (SWEC 1981). This computer program draws plant perspectives based on distances and directions from visually sensitive locations.

The viewshed analysis identified areas from which the station is, and would be, visible. This analysis narrowed the 5-mile study area to a 2-mile viewshed. Extent of visibility was determined through the consideration of four primary data elements: vegetative cover, specifically trees and wooded areas; intervening buildings and development; topography; and postconversion station characteristics, specifically structural additions, elevations, and locations.

Intervening buildings and significant development, namely the downtown and financial districts of the City of Boston which extend from the immediate area west to north-northwest of the station site, screen the facility from sensitive locations in most of Boston and in Cambridge. Residential development and interspersed hills, with elevations from 100 to over 150 feet, provide significant viewshed barriers from areas south of South Boston. Intervening urban development and topographic features focus the area of potential impact to a 2-mile area surrounding the New Boston Station site.

Visually sensitive areas, nonindustrial areas, and intensive land use areas include residential concentrations, recreational and public facility areas, historic sites, scenic areas, as well as highways and major roadways. The visually sensitive locations within the 2-mile viewshed from which New Boston Station may be viewed are primarily residential and recreational areas.

Photographs were taken from nine representative and visually sensitive locations in this surrounding vicinity to assess the visual compatibility and potential change in visual quality which would result from station conversion. These photographs include views from residential areas, major nearby highways, and recreational and historic sites. Table 7.6-1 lists the nine photograph locations. Figure 7.6-2 identifies the locations from which the photographs were taken. Figures 7.6-3 through 7.6-11 show photographs taken from viewing locations with existing conditions and with a perspective drawing of the proposed postconversion facility. Perspective drawings of the postconversion station were based on computer output from the program, Plant Plot , and review of plot plans and the physical model of New Boston Station.

As portrayed by these photographs and supported by the associated analysis, the proposed station conversion, although presenting additional structure construction, will not present a significantly larger mass or height to the viewing area than does the existing station. The moderate mass and size of conversion additions will not effectively change viewscapes beyond 2 miles. With the exception of those residences within the immediate station area and the Christopher Lee Playground and Independence Square Park, the change in visual quality from areas within 2 miles proves minimal, due to effective screening by residential and urban development. In additon, the issue of incompatability and change in visual quality due to facility expansion is reduced further as the industrial character of the site and abutting areas has been established since the early 1900s.

Figures 7.6-10 and 7.6-11 present photographs of views from the Christopher Lee Playground and the intersection of East Broadway and L Street. Structure additions are clearly visible from these two locations. To moderate the change in visual quality from these locations and nearby residences, aesthetic improvement options being considered by BECO for the postconversion station are presented in these closest views. These improvements include the addition of metal siding to enclose the boiler house structural steel of Units 1 and 2 and the removal of retired equipment on the L Street Station roof.

Finally, as discussed in Section 11.2.6, proposed landscaping along the perimeters of Independence Square and the Christopher Lee Playground and along the station's southern perimeter bordering East First Street will serve to partially screen station structures from nearby residences and from park and playground users. After evaluating methods of covering the reserve coal pile, BECO selected the grass-covered option because, when compared to the other options investigated, the grass covering provided the lowest profile and thus was judged to be visually the least intrusive. Figure 11.2-1 presents a schematic landscaping plan for New Boston Station.

7.6.3 Reference

Jones, G. et al and Burham, J. and Geitner, G., A Method for the Quantification of Aesthetic Values for Environmental Decision Making, Nuclear Technology, Vol 25, p 688, April 1975.

Stone & Webster Engineering Corporation (SWEC). Computer Program GR-90 - 3-Dimensional Plant Plotting Program, Boston, MA, July 1981.

TABLE 7.6-1

VISUALLY SENSITIVE AREAS WITHIN 2-MILE VIEWSHED OF NEW BOSTON STATION

Photograph Location-Map Number (1)	Photograph Identification	Location	Approximate Distance & Direction from New Boston Station	Type of Land Use
1	New England Aquarium	Aquarium Wharf	1.6 miles NNW	Recreational area
2	Southeast Expressway (northbound)	-	1.7 miles SW	Major highway artery
3	Columbus Park	W.J. Day Boulevard	1.3 miles SW	Recreational area
4	John F. Kennedy Presidential Library	Dorchester Point	1.7 miles S	Public facility
5	Castle Island	W.J. Day Boulevard	1.2 miles E	Recreational area, historic site
6	Farragut Road	Farragut Road	0.6 miles ESE	Residential area
7	Telegraph Hill	Telegraph Hill	0.7 miles SW	Historic site, educational facility, residential area
8	Intersection of Broadway and L Street	-	0.3 miles S	Major intersection in commercial/retail district
9	Christopher Lee Playground	East First Street	0.25 miles SE	Recreational area

NOTE:

1. See Figure 7.6-2 for photograph locations.

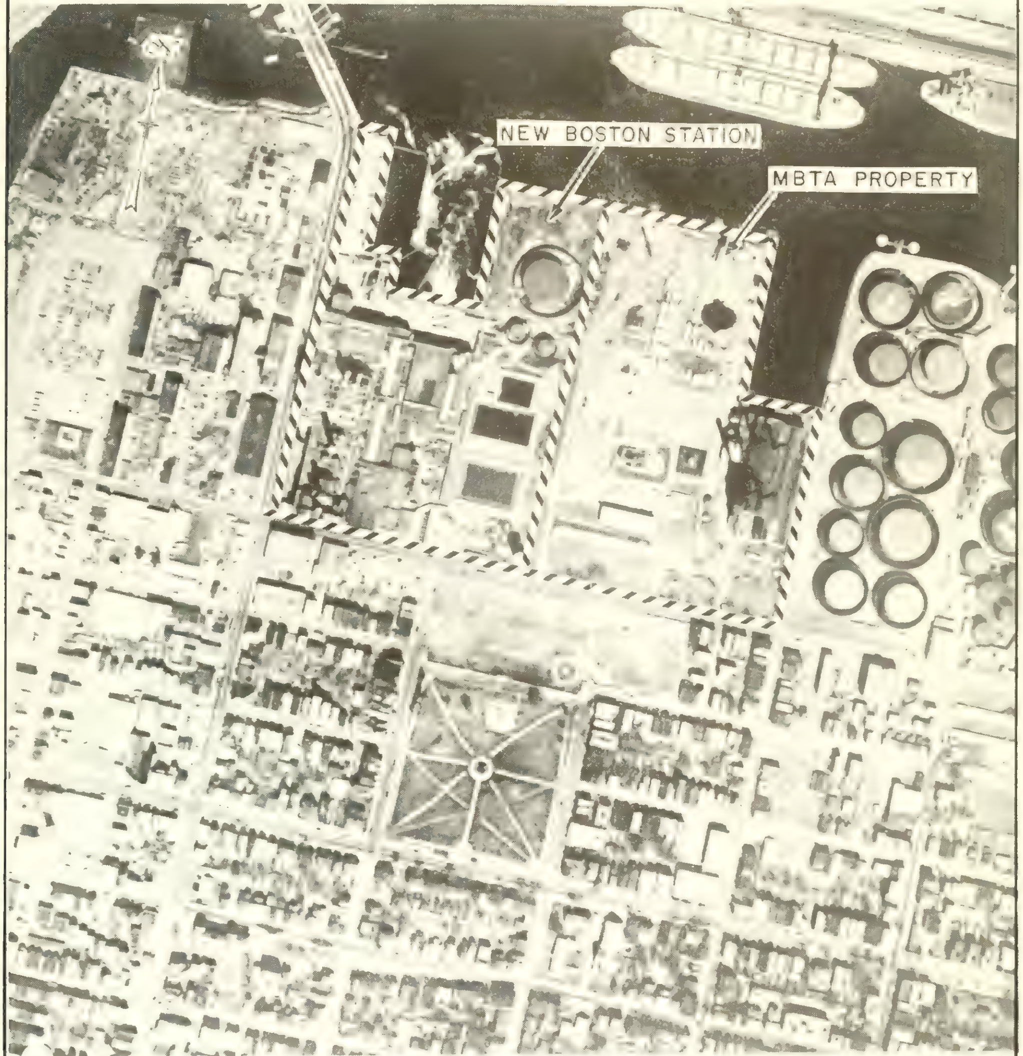


FIGURE 7.6-1
AERIAL PERSPECTIVE OF
NEW BOSTON EXISTING FACILITY
NEW BOSTON STATION - UNIT 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

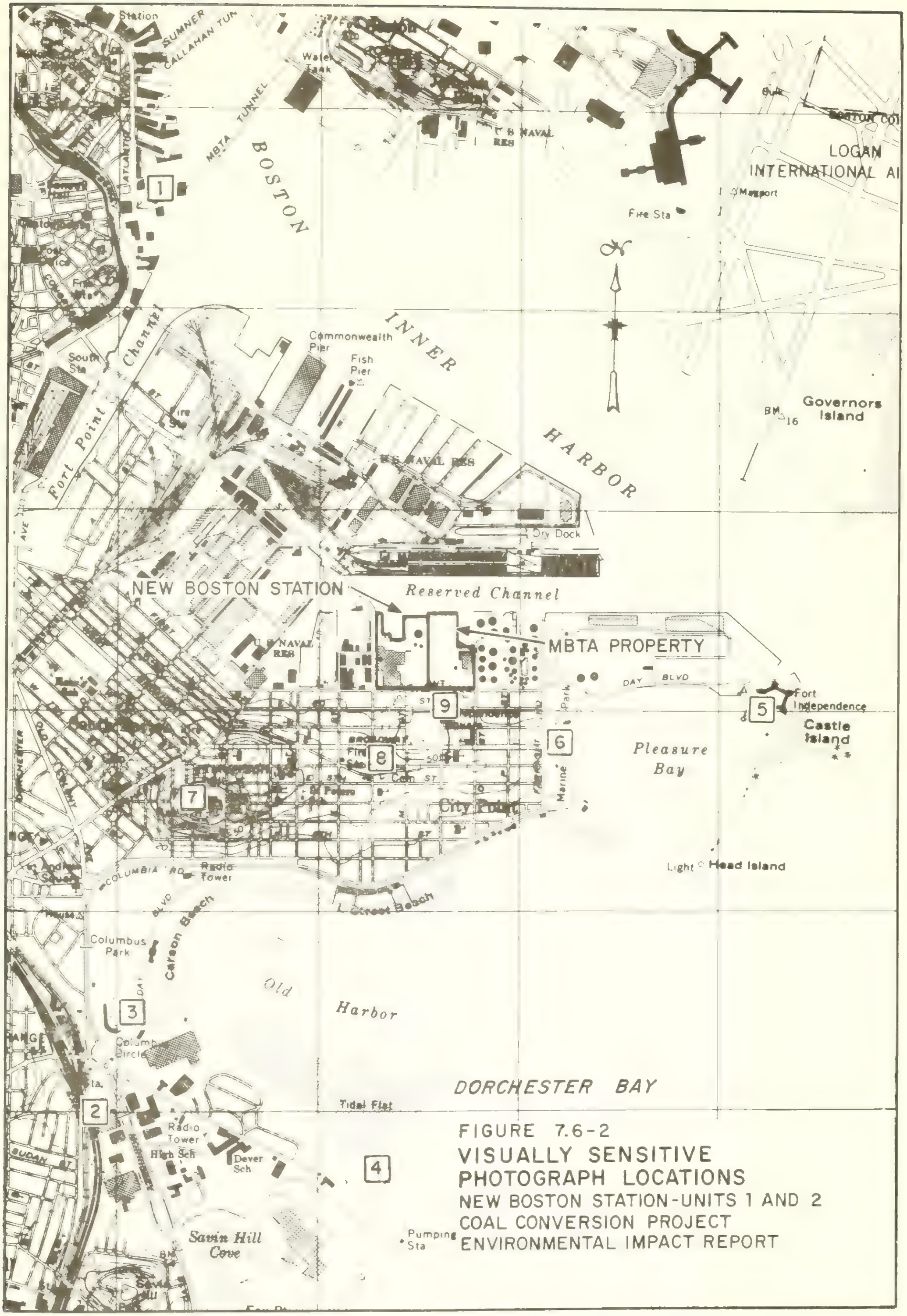
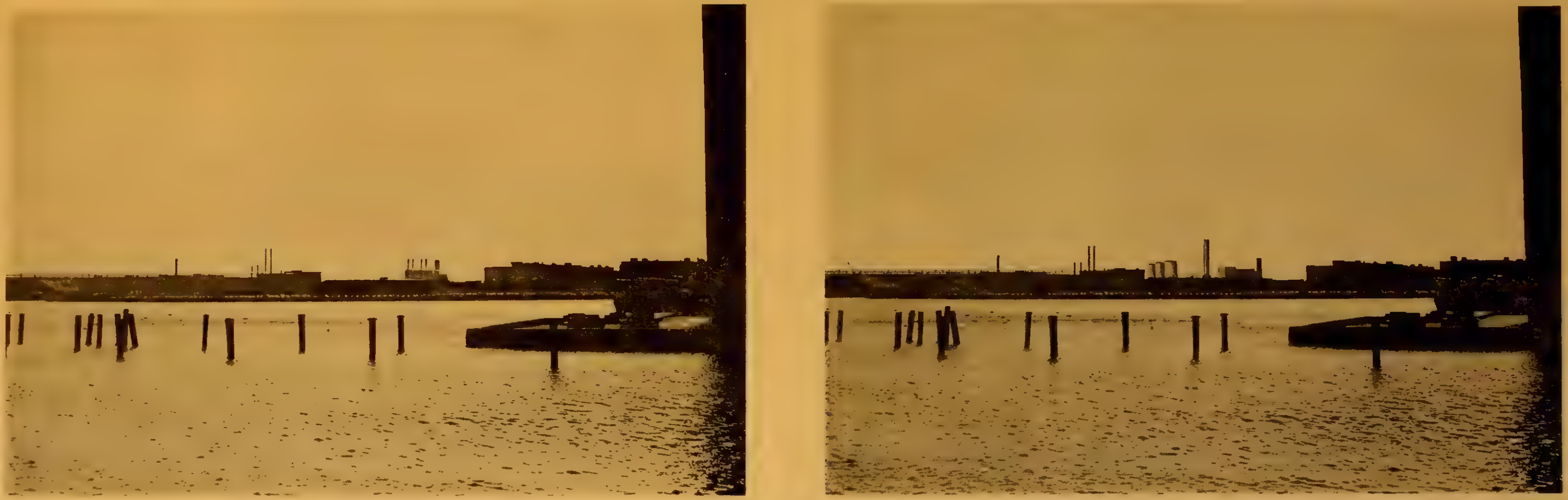


FIGURE 7.6-2

VISUALLY SENSITIVE PHOTOGRAPH LOCATIONS

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT


EXISTING STATION

POSTCONVERSION STATION

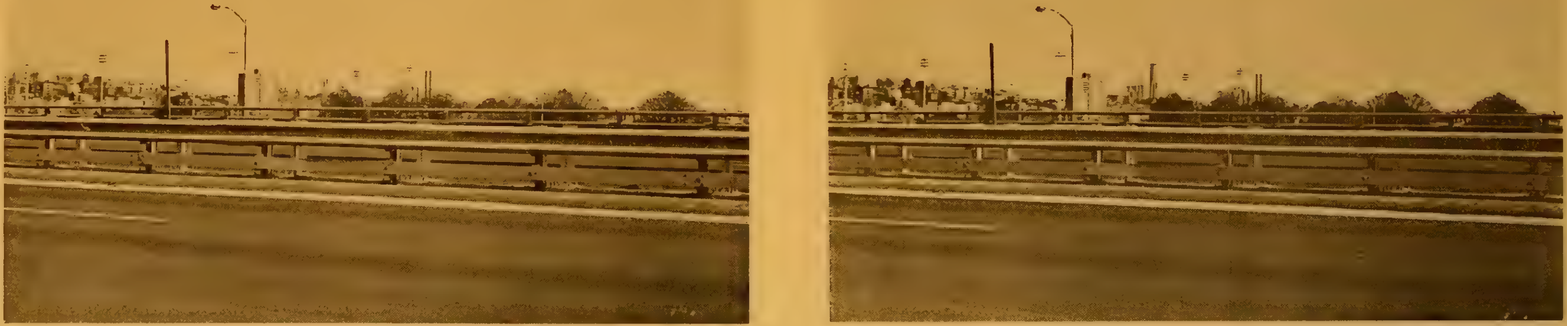
PHOTOGRAPH LOCATION I, THE NEW ENGLAND AQUARIUM WHARF, IS LOCATED APPROXIMATELY 1.6 MILES NORTH-NORTHWEST OF NEW BOSTON STATION.

THE RECREATIONAL AND PUBLIC USE ASPECTS OF THIS SITE QUALIFIES IT AS AN INTENSIVE LAND USE LOCATION.

NOTE

FIGURE 7.6-2 IDENTIFIES THE ACTUAL LOCATIONS OF PHOTOGRAPHIC VIEWS.

FIGURE 7.6-3
VISUAL ASSESSMENT
NEW ENGLAND AQUARIUM WHARF
PHOTOGRAPH LOCATION I
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



EXISTING STATION

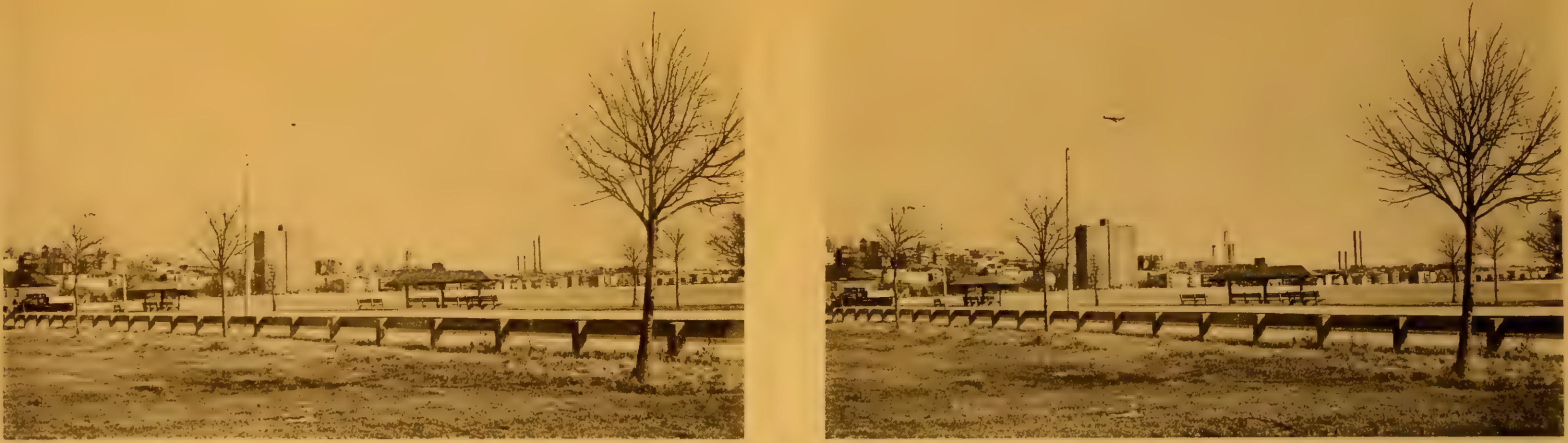
POSTCONVERSION STATION

PHOTOGRAPH LOCATION 2, A POINT ALONG THE SOUTHEAST EXPRESSWAY, IS LOCATED APPROXIMATELY 1.7 MILES SOUTHWEST OF NEW BOSTON STATION.

THE SOUTHEAST EXPRESSWAY SERVES AS A MAJOR TRANSPORTATION ROUTE, WHICH QUALIFIES IT AS AN INTENSIVE LAND USE LOCATION.

NOTE
FIGURE 7.6-2 IDENTIFIES THE ACTUAL LOCATIONS OF PHOTOGRAPHIC VIEWS.

FIGURE 7.6-4
VISUAL ASSESSMENT
SOUTHEAST EXPRESSWAY
PHOTOGRAPH LOCATION 2
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



EXISTING STATION

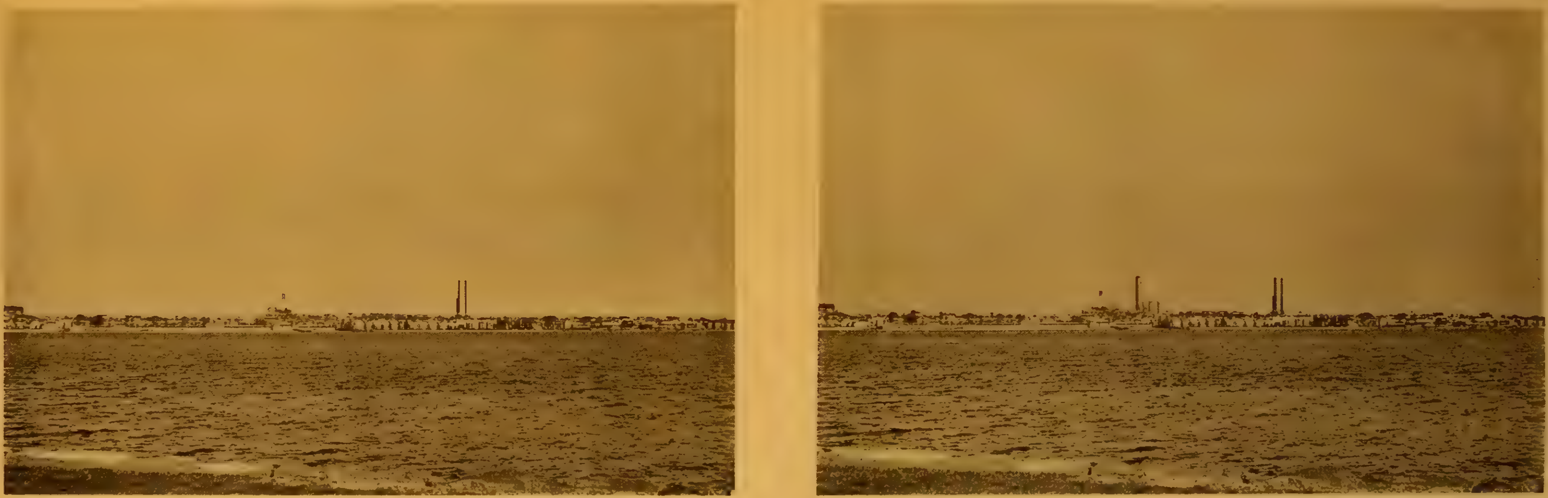
POSTCONVERSION STATION

PHOTOGRAPH LOCATION 3, COLUMBUS PARK, IS LOCATED APPROXIMATELY 1.3 MILES SOUTHWEST OF NEW BOSTON STATION.

THE RECREATIONAL USE OF THIS SITE QUALIFIES IT AS AN INTENSIVE LAND USE LOCATION

NOTE
FIGURE 7.6-2 IDENTIFIES THE ACTUAL LOCATIONS OF PHOTOGRAPHIC VIEWS.

FIGURE 7.6-5
VISUAL ASSESSMENT
COLUMBUS PARK
PHOTOGRAPH LOCATION 3
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



EXISTING STATION

POSTCONVERSION STATION

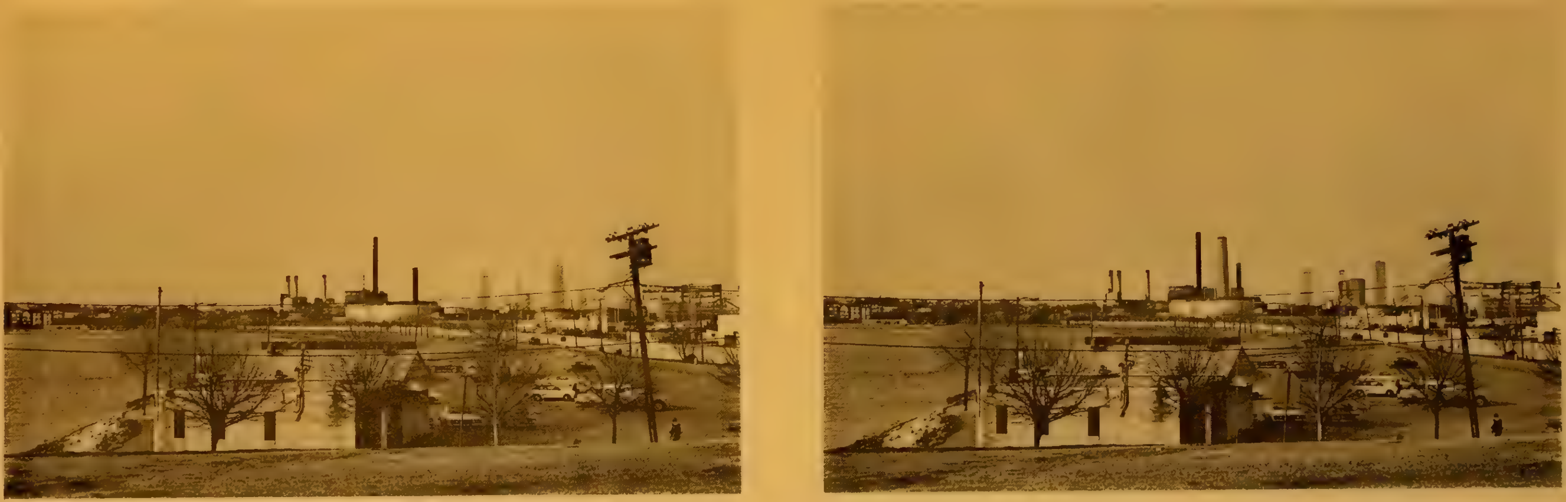
PHOTOGRAPH LOCATION 4, JOHN F. KENNEDY PRESIDENTAL LIBRARY, IS LOCATED APPROXIMATELY 1.7 MILES SOUTH OF NEW BOSTON STATION.

THE RECREATIONAL AND PUBLIC USE ASPECTS OF THIS SITE QUALIFIES IT AS AN INTENSIVE LAND USE LOCATION.

NOTE

FIGURE 7.6-2 IDENTIFIES THE ACTUAL LOCATIONS OF PHOTOGRAPHIC VIEWS.

FIGURE 7.6-6
VISUAL ASSESSMENT
JOHN F. KENNEDY, PRESIDENTAL
LIBRARY-PHOTOGRAPHIC LOCATION 4
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



EXISTING STATION

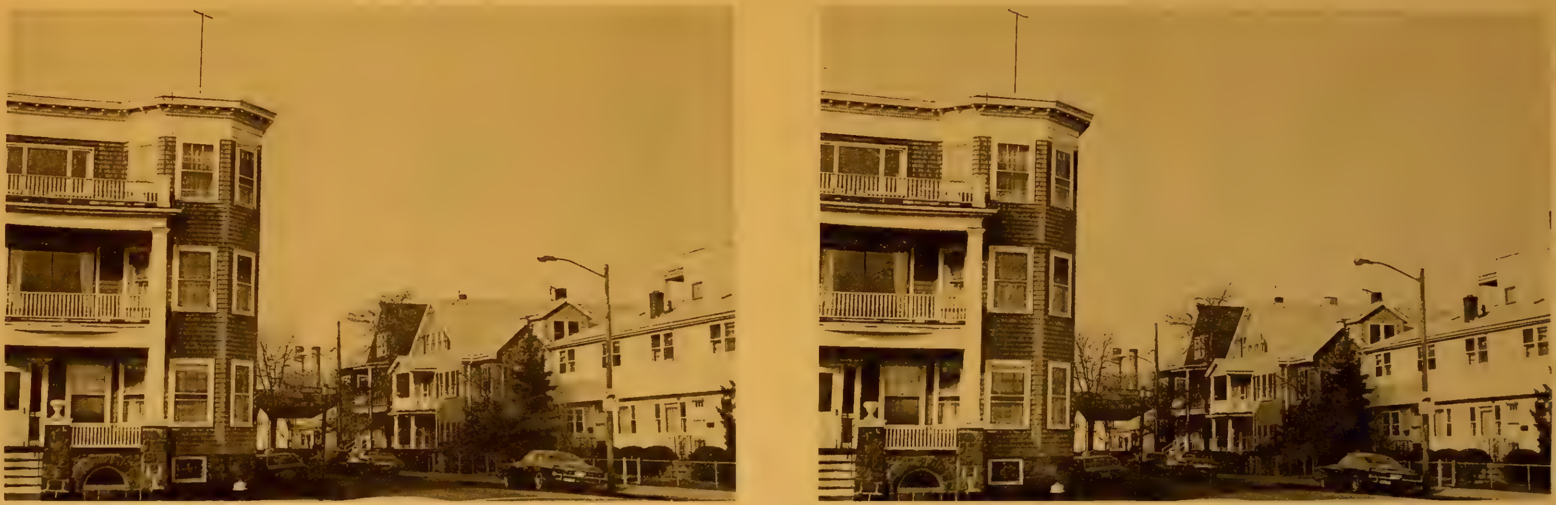
POSTCONVERSION STATION

PHOTOGRAPH LOCATION 5, CASTLE ISLAND, IS LOCATED APPROXIMATELY 1.2 MILES EAST OF NEW BOSTON STATION.

FORT INDEPENDENCE ON CASTLE ISLAND IS LISTED IN THE NATIONAL REGISTER OF HISTORIC PLACES. THE HISTORIC AND RECREATIONAL ATTRACTIONS OF THIS SITE QUALIFIES IT AS AN INTENSIVE LAND USE LOCATION.

NOTE
FIGURE 7.6-2 IDENTIFIES THE ACTUAL LOCATIONS OF PHOTOGRAPHIC VIEWS.

FIGURE 7.6-7
VISUAL ASSESSMENT
CASTLE ISLAND
PHOTOGRAPH LOCATION 5
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



EXISTING STATION

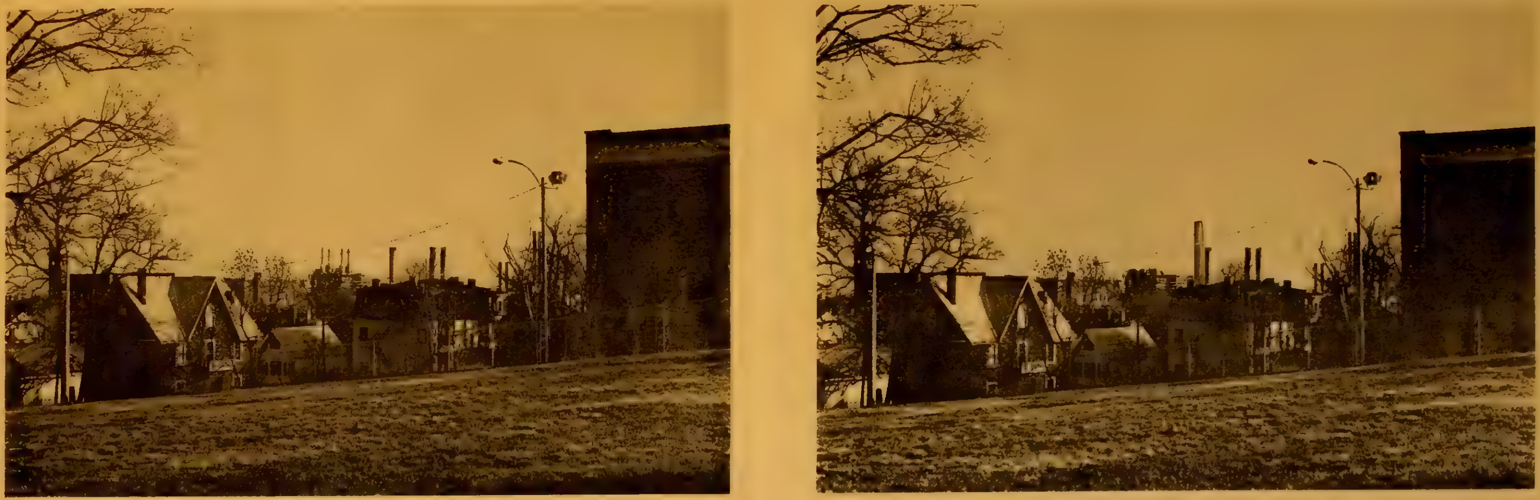
POSTCONVERSION STATION

PHOTOGRAPH LOCATION 6, A POINT ALONG FARRAGUT ROAD, IS LOCATED APPROXIMATELY 0.6 MILES EAST-SOUTHEAST OF NEW BOSTON STATION.

THE RESIDENTIAL CONCENTRATION OF THE FARRAGUT ROAD AREA QUALIFIES THIS SITE AS AN INTENSIVE LAND USE LOCATION.

NOTE
FIGURE 7.6-2 IDENTIFIES THE ACTUAL LOCATIONS OF PHOTOGRAPHIC VIEWS.

FIGURE 7.6-8
VISUAL ASSESSMENT
FARRAGUT ROAD
PHOTOGRAPH LOCATION 6
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



EXISTING STATION

POSTCONVERSION STATION

PHOTOGRAPH LOCATION 7, TELEGRAPH HILL, IS LOCATED APPROXIMATELY 0.7 MILES SOUTHWEST OF NEW BOSTON STATION.

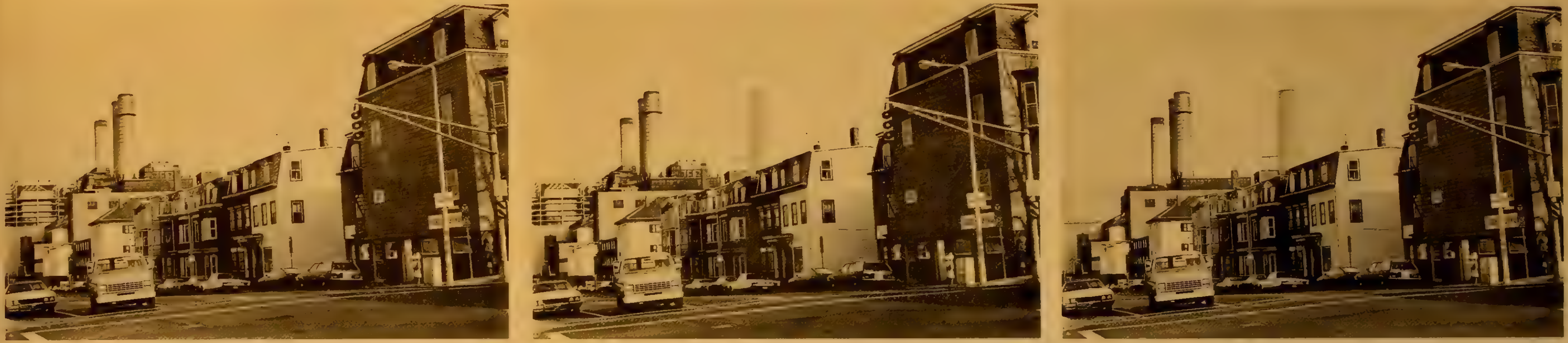
SOUTH BOSTON HIGH SCHOOL AND DORCHESTER HEIGHTS NATIONAL HISTORIC SITE, A NATIONAL REGISTER HISTORIC PROPERTY, ARE LOCATED ON TELEGRAPH HILL.

THE RESIDENTIAL CONCENTRATION SURROUNDING TELEGRAPH HILL, AS WELL AS THE EDUCATIONAL AND HISTORIC ATTRACTIONS LOCATED ON TELEGRAPH HILL, QUALIFIES THIS SITE AS AN INTENSIVE LAND USE LOCATION

NOTE

FIGURE 7.6-2 IDENTIFIES THE ACTUAL LOCATIONS OF PHOTOGRAPHIC VIEWS.

FIGURE 7.6-9
VISUAL ASSESSMENT
TELEGRAPH HILL
PHOTOGRAPH LOCATION 7
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



EXISTING STATION

POSTCONVERSION STATION

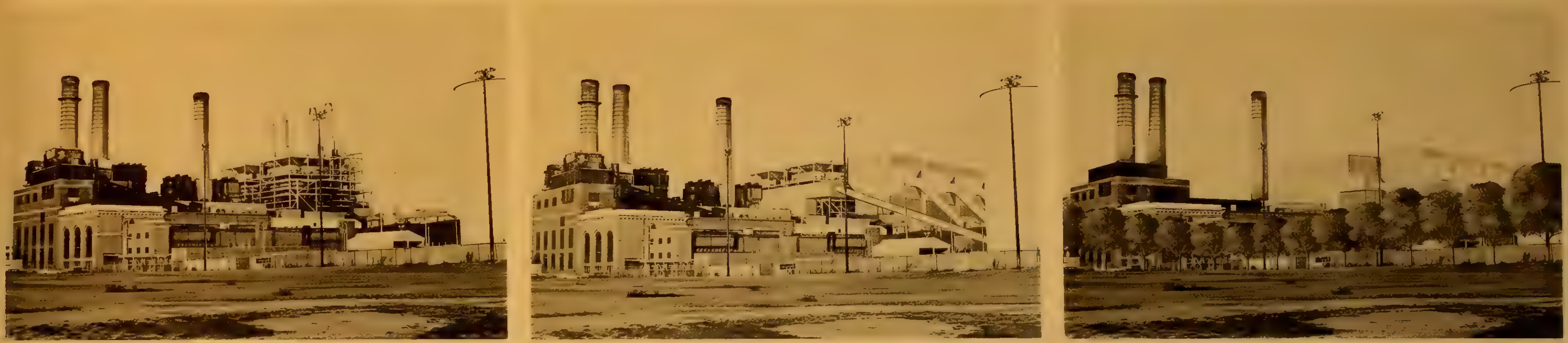
AESTHETIC IMPROVEMENTS TO STATION UNDER CONSIDERATION

PHOTOGRAPH LOCATION 8, THE INTERSECTION OF EAST BROADWAY AND L STREET, IS LOCATED 0.3 MILES SOUTH OF NEW BOSTON STATION.

THE INTERSECTION SERVES AS A MAJOR TRANSPORTATION LINK IN THE COMMERCIAL-RETAIL DISTRICT OF SOUTH BOSTON, WHICH QUALIFIES IT AS AN INTENSIVE LAND USE LOCATION.

NOTE
FIGURE 7.6-2 IDENTIFIES THE ACTUAL LOCATIONS OF PHOTOGRAPHIC VIEWS.

FIGURE 7.6-10
VISUAL ASSESSMENT-PROPOSED AESTHETIC IMPROVEMENTS
EAST BROADWAY AND L STREET
PHOTOGRAPH LOCATION 8
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



EXISTING STATION

POSTCONVERSION STATION

AESTHETIC IMPROVEMENTS TO STATION UNDER CONSIDERATION

PHOTOGRAPH LOCATION 9, CHRISTOPHER LEE PLAYGROUND, IS LOCATED APPROXIMATELY 0.25 MILES SOUTHEAST OF NEW BOSTON STATION.

THE RECREATIONAL USE OF THIS SITE QUALIFIES IT AS AN INTENSIVE LAND USE LOCATION.

NOTE
FIGURE 7.6-2 IDENTIFIES THE ACTUAL LOCATIONS OF PHOTOGRAPHIC VIEWS.

FIGURE 7.6-11
VISUAL ASSESSMENT-PROPOSED
AESTHETIC IMPROVEMENTS
CHRISTOPHER LEE PLAYGROUND
PHOTOGRAPH LOCATION 9
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

SECTION 8

SOLID WASTE MANAGEMENT PLAN

8.1 CONSTRUCTION PERIOD

8.1.1 Demolition Wastes

The required demolition work for the proposed coal conversion is discussed in Section 6.2.1.1. This activity will produce concrete, wood, metal, brick, and other rubble. These wastes will be trucked to a licensed landfill for disposal. If it is practical to do so, the metal and brick wastes may be sold for reuse. No adverse environmental impacts are expected from the disposal or recycling of these wastes.

Asbestos will be removed from structures to be demolished during the construction period and transported to an approved landfill for disposal. Section 11.1.5 discusses the guidelines which will be followed for removal, handling, and disposal of asbestos.

8.1.2 Construction Refuse

Construction refuse includes paper, scrap lumber and metals, packaging materials, and construction crew trash, and may also include excess fill materials, if any. All construction refuse will be transported offsite to a licensed landfill for disposal.

The disposal of construction refuse during the construction period is discussed in Section 11.1.5.

8.1.3 Dredged Material

The construction of a berthing basin along the proposed New Boston Station waterfront will require dredging to a depth of 35 feet below mean low water to accommodate a fully-loaded coal delivery vessel. Dredging will be at lesser depths near the waterfront structures to ensure slope stability. The dredging will result in approximately 25,000 cubic yards of dredged material. A description of the location and extent of the area to be dredged, and the anticipated water quality and aquatic ecology impacts are discussed in Section 7.3.1.

As discussed in Section 3.1.4, ocean disposal of dredged material is regulated by the U.S. Army Corps of Engineers (COE). The intended disposal site for the dredged materials is the Massachusetts Bay Foul Area, located off the north shore and centered at latitude 42 degrees, 25.7 minutes north, longitude 70 degrees, 34.0 minutes west, 14.5 nautical miles southwest of Salem Sound. This location has been designated as an interim approved disposal site by the U.S. Environmental Protection

Agency (EPA), and has been used in the past for the disposal of dredged material and other materials. The COE and EPA are presently only allowing disposal of dredged material at the Massachusetts Bay Foul Area.

The dredging operation for New Boston Station will utilize clamshell equipment mounted on a barge to remove sediment from the Reserved Channel. The dredged material will be loaded into a barge or scow for transportation to the disposal site. After arrival at the Massachusetts Bay Foul Area, the barge or scow will be held at a marked location to minimize dispersion of the material during its release from each pocket of the barge or scow.

The disposal operation will be supervised and monitored by COE personnel.

Physical and chemical characteristics of the sediments to be dredged from the Reserved Channel are presented in Tables 8.1-1 and 8.1-2, respectively. Sediment sample locations are shown in Figure 8.1-1. The sediments are primarily classified as Category 3, Type C, using the classification system from the Department of Environmental Quality Engineering (DEQE), Division of Water Pollution Control, for evaluating and certifying dredging projects (314CMR9.00).

Solid phase bioassay and bioaccumulation testing of the sediments to be dredged was also performed to assist the COE in its evaluation of Boston Edison Company's (BECO) proposed ocean disposal plan for these sediments. This testing included a standard 10-day solid phase bioassay using two sediment treatments and three species of marine test organisms, and bioaccumulation analysis of three species for five key chemical constituents utilized by the COE in its evaluation. The two sediment treatments were as follows: a Reference Series consisting of sediments collected from the Massachusetts Bay Foul Area; and a Test Series consisting of sediments collected from the proposed dredging site in the Reserved Channel (see Figure 8.1-1). The three marine invertebrate species exposed to these sediment treatments for a 10-day period were: the grass shrimp, Palaemonetes vulgaris; the sand worm, Neanthes virens; and the hard-shell clam, Mercenaria mercenaria. Test results are presented in Table 8.1-3.

The bioassay results indicate that mean survival in the Test Series (Reserved Channel sediments) did not significantly differ from survival in the Reference Series (Massachusetts Bay Foul Area Sediments). For bioaccumulation test results, no significant differences in tissue concentrations of cadmium or mercury were seen between any reference organisms (exposed to reference sediments) and test organisms (exposed to Reserved Channel sediments).

For DDT, tissue levels of DDT were significantly higher in the test Mercenaria mercenaria, as compared to the reference animals of this species. Tissue levels of DDT in Palaemonetes vulgaris and Neanthes virens were not significantly higher in the test organisms as compared to the reference organisms. PCB tissue levels of test Neanthes virens were significantly higher than the reference Neanthes virens. PCB tissue concentrations for test Palaemonetes vulgaris or Mercenaria mercenaria were not significantly different from reference animals of these species.

In Palaemonetes vulgaris and Mercenaria mercenaria, tissue concentrations of petroleum hydrocarbons in the test organisms were not significantly higher than the reference organisms. For Neanthes virens, tissue concentrations of petroleum hydrocarbons in the reference organisms were higher than the test organisms.

Although the increased tissue concentrations of PCB in Neanthes virens and of DDT in Mercenaria mercenaria were statistically significant in the test organisms, as compared to the reference organisms, the concentrations were extremely low (in the parts per billion range). Since the Massachusetts Bay Foul Area already contains PCBs and possibly DDT, this would not appear to constitute an important impact source.

Section 7.3.1.5 provides a description of anticipated aquatic ecology impacts.

A summary of the protocol used for sampling and analysis of dredged material from the Reserved Channel is presented in Appendix G.

TABLE 8.1-1

GRAIN SIZE ANALYSIS OF RESERVED CHANNEL SEDIMENT(1)

		Percent of Total by Weight				
Sample No.(2)	Depth(3) Ft	Coarse Gravel >64 mm	Fine Gravel 2-64 mm	Sand 0.063-2mm	Silt 0.004-0.003mm	Clay <0.004mm
B-204A	0-4	0	2.1	1.8	24.1	72.0
	8-12	0	0.5	1.4	21.1	77.0
B-207	5.5-7	0	20.0	21.5	45.5	13.0
B-222	0-4	0	1.2	0.9	39.9	58.0
	4-10	0	1.0	4.1	29.4	65.5

NOTES:

1. Reference: Stone & Webster Engineering Corporation. "Report on Subsurface Investigation for Preliminary Engineering - New Boston Station Units 1 and 2 Coal Conversion, South Boston, Massachusetts." Study performed for Boston Edison Company, January 1983.

2. Sample locations are shown on Figure 8.1-1.

3. Depths are below the sediment/water interface at the bottom of the channel.

TABLE 8.1-2

BULK SEDIMENT CHEMICAL ANALYSIS OF
RESERVED CHANNEL SEDIMENTS IN PROPOSED DREDGE AREA
NEW BOSTON STATION COAL CONVERSION - BOSTON EDISON COMPANY

Parameter	Concentration (1)						
Sample No. (2)	B-222		B-204A				B-206
Depth (ft)	(0-4)	(4-10)	(0-4)	(4-10)	(10-12)	(12-16)	(6-8)
Water, %	26.46	24.56	28.44	29.10	27.67	25.02	58.55
Specific gravity (bulk)	1.7816	1.819	1.7664	1.7816	1.7880	1.8062	1.2110
Silt-clay, %	98	95	96	NT (1)	98 (3)	NT	60 (4)
Total solids, %	73.54	75.44	71.56	70.90	72.33	74.98	41.45
Volatile solids, %	2.46	2.17	3.72	3.05	2.71	3.44	20.72
Oil & grease, %	0.02	0.30	0.78	2.06	1.63	ND	4.41
PCBs ug/kg (5)	ND	ND	10	16	ND (6)	ND (6)	720
Cadmium, mg/kg	0.903	0.796	1.07	1.12	0.939	0.916	1.70
Chromium, mg/kg	45.26	36.87	53.65	49.83	52.82	41.49	76.99
Copper, mg/kg	13.83	13.65	20.54	21.20	15.09	17.99	67.84
Iron, mg/kg	26525	19706	39085	36050	31387	27489	13664
Vanadium, mg/kg	49.03	38.27	56.66	51.82	54.83	42.77	49.48
Nickel, mg/kg	28.67	24.14	35.22	34.69	32.31	28.65	22.04
Mercury, mg/kg	8.57	7.54	10.45	10.78	9.58	7.89	3.36
Zinc, mg/kg	65.96	54.87	78.28	75.24	68.92	66.44	104.67
Arsenic, mg/kg	48.02	44.12	55.04	53.68	52.81	43.99	16.85
Lead, mg/kg	12.55	11.73	14.44	12.94	13.07	11.02	63.20

NOTES:

1. ND - Not detected; NT - not tested
2. Refer to Figure 8.1-1 for sample locations
3. Depth into sediment - 8 to 12 feet
4. Depth into sediment - 0 to 2 feet at Sample No. B-207
5. PCB limit of detection is 1 ug/kg
6. PCB limit of detection is 1 mg/kg

SOURCES:

1. Stone & Webster Engineering Corporation. Report on Subsurface Investigation for Preliminary Engineering, New Boston Station Units 1 and 2 Coal Conversion. Study performed for Boston Edison Company, January 1983.

2. New England Testing Laboratory, Inc. Sediment Sample Analysis, Reserved Channel Adjacent to New Boston Station, December 1982.

Table 8.1-3

BIOASSAY AND BIOACCUMULATION TEST RESULTS FOR RESERVED CHANNEL SEDIMENT(1)

RESULTS OF SOLID PHASE BIOASSAY 10-DAY EXPOSURE

Species	Mean Survival at 10-Days	
	Reference Sediments(%)	Test Sediments(%)
Palaemonetes vulgaris	89.2	90.4
Neanthes virens	99.0	100
Mercenaria mercenaria	100	100

RESULTS OF BIOACCUMULATION ANALYSIS, MEAN TISSUE LEVEL

Parameter	Palaemonetes vulgaris		Neanthes virens		Mercenaria mercenaria	
	Reference	Test	Reference	Test	Reference	Test
Cadmium (mg/kg)	0.10	0.20	0.24	0.37	0.84	0.86
Mercury (mg/kg)	0.38	0.48	0.28	0.24	0.10	0.06
PCB (ug/kg)	12.00	22.80	4.74	31.70*	5.88	7.62
DDT (ug/kg)	1.28	3.10	0.87	1.04	<0.03	0.84*
Petroleum Hydrocarbons (mg/kg)	10.6	12.7	33.6	28.1	9.4	39.6

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*denotes significant difference

NOTE:

1. Battelle, New England Marine Research Laboratory. Final Technical Report on Solid Phase Bioassay and Bioaccumulation Studies on Sediments from the Reserved Channel, Boston Harbor. Study performed for Boston Edison Company, April 1983.

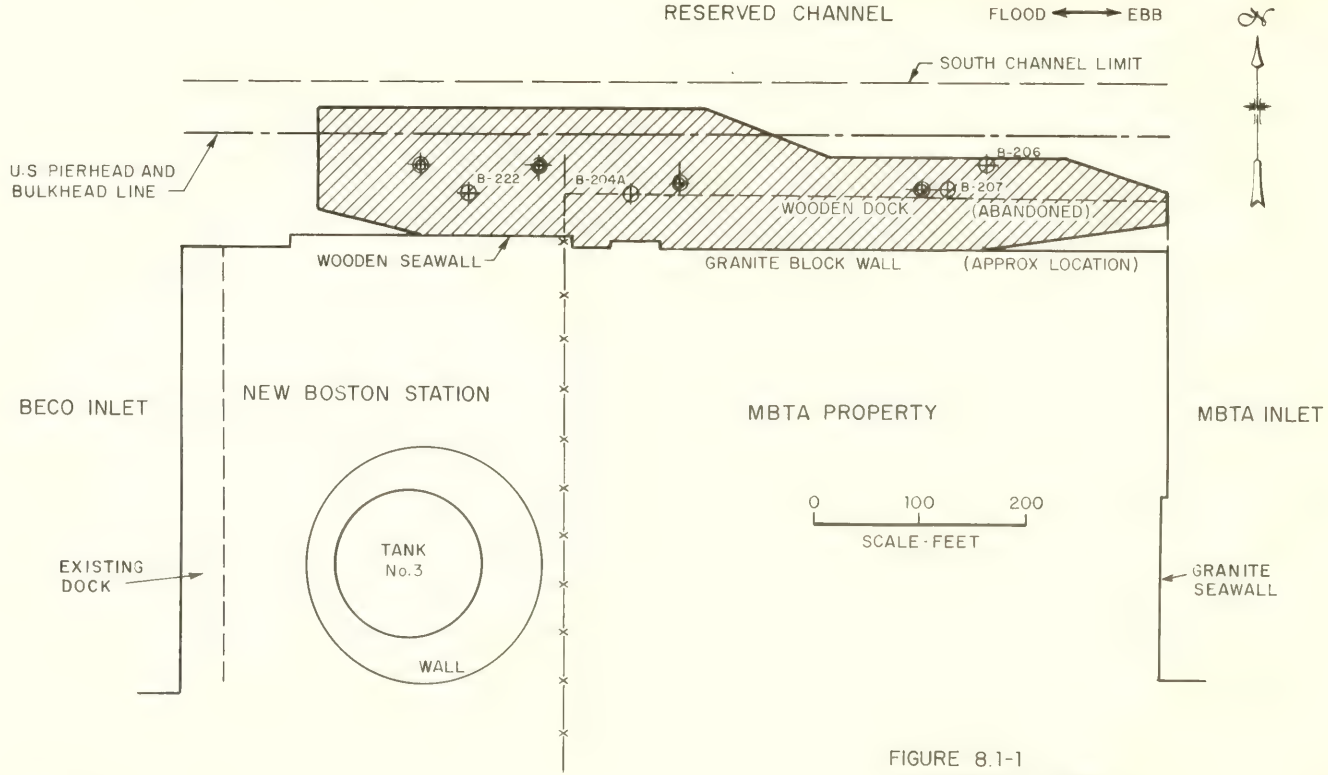


FIGURE 8.1-1
LOCATION OF TEST SEDIMENT COLLECTIONS
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

8.2 OPERATIONAL PERIOD

8.2.1 Coal Ash Management

8.2.1.1 Introduction

A major environmental issue Boston Edison Company (BECO) must address with the proposed coal conversion of Units 1 and 2 at New Boston Station is the management of bottom ash and fly ash generated by the coal-fired units. Both bottom ash and fly ash are considered to be a resource in the Commonwealth of Massachusetts, and are not considered to be hazardous by the Massachusetts Department of Environmental Quality Engineering (DEQE) or the U.S. Environmental Protection Agency (EPA).

Ash management, as with all solid waste management, involves consideration of both technical and nontechnical issues. The technical issues, such as transportation and type of management system, can be scientifically described and evaluated using standard technical and economic criteria. The nontechnical issues require a thorough understanding of governmental agency and public concerns relating to waste management.

Ash Management Philosophy

The BECO coal ash management program is based on the concept of maximizing ash utilization while recognizing that a suitable site dedicated to the storage/disposal of ash must also be developed. Ideally, the storage/disposal site should be available before coal is fired since it is unlikely that binding, long-term commitments for the reuse of all of the ash will be obtained for the life of the converted facilities. With a dedicated ash storage/disposal site available, BECO will have the flexibility of storing ash at a licensed facility during those periods when reuse options are not available. Such a dedicated facility will strengthen BECO's reuse options. As the reuse options become available, the material can be transferred from the storage site or the plant to the market. This facility will also provide for the storage/disposal of ash that exceeds the immediate potential for reuse. The development of a dedicated storage/disposal site is considered a long-term option and is covered in detail in Section 8.2.1.3. The development of a storage/disposal site will be backed up by establishing potential for the disposal and/or use of ash at existing sanitary landfills. The use of existing landfills is a short-term option and is discussed in Section 8.2.1.2. Coal ash utilization is discussed in Section 8.2.2.

Any ash management program begins with the development of ash volume projections. The assessment of utilization potential, transportation needs, and storage/disposal requirements are all based, in part, on ash volumes. The management plan presented herein is based on data developed by BECO, as summarized in Table 8.2-1. Assumptions have been made relative to the ash content of coal. For planning purposes, a 9-percent ash content coal is used. At this early stage in the planning process, BECO expects that the average ash content of the coal to be burned will be below 9 percent.

The conversion of New Boston Units 1 and 2 could result in the generation of about 152,000 tons of ash per year. At a landfilled density of 75 lb/cu ft, this translates into 93 acre-feet of ash per year. As stated, these figures assume an ash content of 9 percent and a 70-percent annual average capacity factor.

Ocean Disposal

Ocean dumping of coal ash is often suggested as an alternate disposal method to landfilling. Ocean dumping has historically been used for disposal of some municipal wastewater sludges and industrial wastes. Within the past 10 years, however, EPA has formulated strict regulations governing ocean disposal; as a result, most ocean dumping operations have ceased or are under compliance orders to phase out in favor of developing alternative disposal methods. Because of EPA's reluctance to license additional industrial waste dumping operations, ocean disposal does not appear to be a viable disposal alternative at the present time. BECO does not plan to pursue this option unless there is a change in EPA policy.

Ash Characterization

Introduction

Since BECO is in the early planning stage for the conversion of New Boston Station to coal, a specific source of coal has not been selected. The New Boston Station units under consideration for conversion, however, were designed originally for the use of high-grade eastern bituminous coals and will burn a high-grade bituminous eastern coal, if converted.

This section of the report describes the general characteristics of coal ash that could be expected for an eastern coal.

The level and sophistication of design required for an ash management program is influenced by the quantity and character of the ash produced. Similarly, the extent to which ash may be marketed for reuse is directly influenced by its character and consistency. For reuse, a quality assurance/quality control program is required to ensure that the ash meets acceptable quality criteria.

Physical Characteristics

Table 8.2-2 summarizes ash percentages and other characteristics of various eastern coals. The ash produced by New Boston Station is expected to be approximately 20 percent bottom ash and 80 percent fly ash.

Studies have shown that the specific properties of coal ash vary from plant-to-plant due to the combustion systems utilized and the source of the fuel. Since BECO has not yet generated any coal ash, the coal ash data reviewed here cover the range of fuels and combustion systems presently used by eastern utilities.

1. Physical Characteristics of Fly Ash

Fly ash is that portion of the ash from the coal combustion process which is recovered from the flue gases. The properties of fly ash are dependent on a number of variables including the type of coal used and how it is processed, the equipment used to burn the coal, and the methods of collecting and handling the ash.

Fly ash consists primarily of spherical glass-like particles with a fairly uniform gradation and a specific gravity lower than that encountered for most soils. The color of fly ash can range from cream to dark brown or gray. Darker colors indicate increasing carbon contents while lighter colors indicate higher calcium oxide contents. Fly ash, although a granular material, exhibits consolidation characteristics similar to cohesive soils. Fly ash has good shear strength which it obtains through internal friction. Compaction of fly ash will increase its shear strength, decrease its compressibility, and further lower its permeability.

2. Physical Characteristics of Bottom Ash

Bottom ash refers to ash which is removed from a dry-bottom boiler in solid granular form. Bottom ash consists of angular particles with porous texture ranging in size from that of fine sand to fine gravel. Because of its texture and size, bottom ash is more permeable than fly ash. The color is normally gray to black (EPRI 1979). The addition of bottom ash to fly ash can improve the compaction characteristics of the fly ash. Bottom ash can also be used as a drainage blanket in a disposal area.

Chemical Characteristics of Fly Ash and Bottom Ash

Chemical composition of coal ash is dependent primarily upon the elemental makeup of the coal used. The type of combustion and ash collection equipment, degree of pulverization of the coal, temperature during combustion, and other factors further influence the makeup of the ash. The chemical characteristics of fly ash are similar to those of bottom ash, although bottom ash may have a lower carbon content (EPRI 1979).

Leachate Characteristics

Ash from coal-fired utility boilers is defined as "nonhazardous waste", based on EPA's hazardous waste criteria published in the Federal Register on May 19, 1980, pursuant to the Resource Conservation and Recovery Act, and the Massachusetts Phase I Hazardous Waste Regulations of July 1982.

Water in contact with coal ash can pick up many of the constituents present in the ash. The specific leachate characteristics for a particular coal ash have many variables which affect its formation; e.g., elemental makeup of the coal, type of combustion system used, combustion temperature, and ratio of sulfur to calcium in the ash and the pH of the water the ash comes in contact with.

Although it is not possible to accurately predict the exact character of leachate, a review of available data clearly shows that the leachate is relatively dilute and contains low concentrations of the significant leachable components. For this reason, it is believed that a properly designed ash storage/disposal facility will pose no significant risk to the environment.

8.2.1.2 Short-Term Management

Disposal in Existing Sanitary Landfills

For the short term, it may be necessary for BECO to contract with one or more commercially available and approved landfills for the disposal of fly ash and bottom ash. Although it is not BECO's preference to dispose of coal ash at a commercial landfill, this may be necessary if a dedicated storage/disposal site is not licensed before coal ash is produced.

Contacts have been made with four landfill operators. All have expressed a willingness to work with BECO toward finalizing an arrangement whereby it can be assured that ash disposal can be handled in an environmentally acceptable manner.

8.2.1.3 Long-Term Management

BECO's long-term coal ash management plan is to license a dedicated storage/disposal site for coal ash. The process leading to final site selection has begun and is discussed below. At this point in the process, four locations are under consideration as potential ash disposal sites.

Disposal in Future Ash Disposal Sites

The site selection process utilized criteria that was selected to identify environmentally acceptable areas and to minimize inconvenience to people in the vicinity of such an area. An objective screening process was followed.

The site selection process included several steps which were completed sequentially. These steps were:

1. Selection of site criteria
2. Identification of sites
3. Initial site screening
4. Evaluation of the sites
5. Identification of those sites which warrant further consideration
6. Performance of detailed site studies

Once the sites warranting further study were identified, site access was obtained to permit onsite studies to be undertaken. Limited onsite studies have been completed. Further work is required but will not be initiated until the final decision is made to convert to coal.

Site Criteria

The site criteria used in the screening process for the BECO coal ash storage/disposal facility included both environmental and social elements.

1. Environmental Criteria

   The environmental criteria used were as follows:

   a. The site should not overlie a surficial geological formation such as an esker, outwash plain, glacial marine delta, kame, stratified moraine and other deposits commonly consisting of sand and/or gravel, or have shallow bedrock conditions. This is to minimize the chance for leachate migration from the site.

b. The site boundary should not lie close to a surface waterbody. A setback requirement minimizes the possibility of impact on surface water.

c. The boundary of the site should be at least 1000 feet from a public water supply. Further separation may be warranted if the supply is down gradient of the site.

d. The site should not be within a 100-year flood plain.

e. The site should not lie within the boundaries of a moderate or high yield aquifer. This type of aquifer has potential as a public water source.

2. Social Criteria

Setback requirements were used in the site screening process to isolate the site, as much as possible, and to mitigate potential social impacts. The following setbacks were used in identifying potential areas:

a. There should be a 100-foot buffer zone between site boundaries and all public roads and all other property boundaries.

b. The site boundary should, in general, not lie closer than 1000 feet to the nearest residence.

c. The site should not be located in environmentally sensitive areas such as:

- Federal, state, or town forests
- Wildlife management areas
- Military reservations
- Federal, state, or town parks, or preserves
- Swamps or bogs that encompass more than 100 acres in surface area
- Conservation land

Site Selection

Initially, a large number of sites were identified as possible ash storage/disposal areas. Eventually, using the site selection process, the number of potential sites was reduced to four. Included in the four sites are two sites north of Boston and two sites south of Boston.

Detailed Site Studies

The final step in the site selection process is to conduct detailed site work which includes digging backhoe pits and boring operations. BECO has initiated this work and has obtained preliminary results for each of the four sites. However, this work will not be completed until after a decision is made to convert to coal.

Design and Development Considerations

The design and development of a dedicated ash storage/disposal facility must conform to the general regulatory requirements and site specific constraints. The objective of the design and development process is to maximize site capacity while minimizing environmental risks and costs. The objective of this section is to review the factors which must be considered in the design, development, and operation of an ash storage/disposal area. Based on these considerations, conceptual design criteria have been established.

Regulatory agencies have become increasingly aware of the need for dedicated coal ash disposal sites because of increased emphasis on the use of coal as a less expensive and reliable replacement for oil. As stated beforehand, based on the regulations of the EPA and the Commonwealth of Massachusetts, coal ash is not a hazardous waste.

Coal ash, in general, presents little potential for environmental impact, provided it is managed within the guidelines established for proper siting, construction, operation, and closure procedures. These guidelines include:

1. Adequate setbacks from surface water, drinking water supplies, residences, and roads
2. Development of a basal liner of low permeability
3. Maintenance of a zone of separation between the base of the landfill material and the maximum level of the water table
4. Establishment of surface water runoff controls, such as diversion ditches, berms, cover material, and vegetation

5. Establishment of leachate collection systems and groundwater monitoring systems

6. Implementation of procedures to control dust

7. Establishment of an appropriate final grading plan, final cover system, and vegetation to assure that the area is aesthetically pleasing

8. Operational and security procedures to minimize risk to workers and nearby residents

These general conditions form the basis for the design criteria for an ash storage/disposal area. Although the conditions are similar for any facility, their actual implementation and their costs are very site specific.

8.2.1.4 Ash Transportation

The transportation of coal ash from New Boston Station represents an important consideration. BECO has evaluated ash transport from New Boston Station by truck, rail, and barge, depending on the location of the storage disposal site selected, as well as factors associated with the station. Pending final site selection, only the potential impacts of ash transport on local routes between the station and the regional transportation network have been evaluated.

The impact of truck traffic on the designated truck routes between the station and Interstate 93/Route 3, providing access to the north and south, has been evaluated. Once on the highway, it is assumed that trucks transporting ash will not have a significant impact on existing traffic volumes, given the high levels of use by both trucks and general vehicles on the interstates. Rail transportation is evaluated from New Boston Station to the Conrail track at B Street, while the evaluation of barge transportation is limited to the Reserved Channel and its tie-in to the main channel of Boston Harbor. Evaluations are made based on existing and expected base year (1987) conditions for the three options. 1987 is used as the base year because it is the expected date of startup of the first converted unit.

The impacts for each of the three alternatives (detailed in Appendix E) are summarized below. Based on the anticipated number of trucks, about 5 to 7 per hour under average and peak operating conditions at New Boston Station, and the exclusive use of designated truck routes in South Boston, the impacts resulting from this option will be minimal. The selection of the rail option for ash transport is precluded by limitations onsite (lack of space available) as well as the introduction of annoying noise impacts at night. No adverse impacts associated with the transport of ash by barge would be expected.

Truck Option

1. Introduction

In evaluating the probable impacts from the addition of transport truck activity between New Boston Station and Interstate 93/Route 3, the following items are examined:

a. Designated truck routes and traffic volumes for existing and anticipated base year (1987) conditions

b. The probable impacts due to the added truck traffic from coal ash removal operations

2. Existing and 1987 Truck Routes and Traffic Conditions

Truck access to New Boston Station exists along several routes. Figure 8.2-1 shows those routes designated for truck access from New Boston Station to the regional highway network.

As of March 1983, an evaluation of existing truck routes providing access to and from New Boston Station and the regional access system resulted in the following conclusions:

a. South or Westbound Truck Routes

The shortest and most appropriate route for outbound truck traffic bound south or west of New Boston Station includes East First and West First Streets to B Street, to West Second Street to Dorchester Avenue, and across the Broadway Bridge. Inbound traffic is required to follow the designated truck route east on Broadway to C Street to West First Street.

Due to the added distance and volume of traffic along Dorchester Avenue, access to the Southeast Expressway from Southampton Street via Andrew Square, should be considered a secondary alternative.

b. Northbound Trucks

Access to the Central Artery for trucks traveling north of Boston can best be accomplished in one of several ways.

- Along East First and West First Streets to Second Street to Dorchester Avenue and the Broadway Bridge as described above
- Along East First, West First, D, and Summer Streets to Atlantic Avenue
- Along East First, West First, D, and Fargo Streets to B Street and then to Congress Street or Northern Avenue to Atlantic Avenue. Due to the poor existing condition of B Street, this alternative presently represents an option for avoiding Dewey Square only when conditions warrant, such as during rush hours.

Truck routes, following A, C, and E Streets, currently present less advantageous alternatives due to potential conflicts with existing warehouse truck traffic.

Heavy truck traffic is presently excluded on the Summer Street Bridge. A number of proposals for bridge and roadway improvements in South Boston, including structural upgrading of the Summer Street Bridge and the construction of a new Northern Avenue Bridge are expected to be in place by 1987. These improvements are described in Appendix E.

In addressing the impacts of ash truck activity at New Boston Station, traffic volumes, levels of service, and accident information presented in a number of reports, as summarized in Appendix E, were evaluated.

On the basis of this evaluation, average daily total traffic and truck volume estimates were developed for the 11-hour (7 am to 6 pm) time period for the base year. These base-year average daily 11-hour traffic forecasts, as presented in Figure 8.2-2, reflect the traffic volumes along the primary ash truck routes to and from New Boston Station during the times ash truck activity is scheduled (Monday-Saturday only). As shown in Figure 8.2-2, those routes most likely to be used by the ash trucks including West First and Summer Streets, Broadway, and Northern Avenue will typically handle 1000 to 2000 trucks per 11-hour day. While truck traffic on East First Street is expected to average 700, this will represent approximately 26 percent of the relatively low 11-hour total traffic volume of 2650.

Peak-hour traffic volumes from existing studies were similarly adjusted to the base year for selected intersections along the designated truck routes. Calculations of the associated am and pm levels of service (LOS) at these intersections were examined to determine the likely points of traffic congestion. LOS is defined as the measure of operational efficiency for a roadway or intersection where LOS A represents the optimum or free flow condition, and LOS E is a condition of unstable flow where excessive traffic congestion exists. LOS F, or the worst condition, exists when traffic delays prevent vehicles from entering the intersection. The results of this survey are shown on Figure 8.2-3.

The intersections identified as those likely to experience significant reductions in levels of service during the morning and evening peak "rush" hours, were those at the key access points to South Boston. With predicated LOS of F for both peak hours, Andrew Square is shown to be a major bottleneck. Likewise traffic volumes along Atlantic Avenue in the vicinity of intersections with Northern Avenue, Congress Street, and Summer Street; and Dorcester Avenue at Broadway are predicted to result in unacceptable levels of congestion. Therefore, recommended routes for the ash transport trucks are shown with an alternate am peak hour route in Figure 8.2-4. Recommended measures for mitigation of environmental impacts are discussed in Section 11.2.7.

Data on the frequency of traffic accidents at selected locations along designated trucks routes were compiled from several sources, as summarized in Appendix E. While many of the routes exhibiting the greatest number of recorded accidents are often used by trucks, none of the reports indicate an abnormally high involvement of trucks.

3. Probable Impacts

After the conversion of New Boston Station Units 1 and 2 to coal, it is estimated that an average of 27 (20-ton total capacity) truck loads of coal ash per day will be removed from the station. Trucking operations will take place between the hours of 7 am and 6 pm, Monday through Saturday. Based on this 11-hour per day, six days per week schedule, the average one-way frequency for the loaded vehicles is approximately 2.5 trucks per hour. Since an equal number of unloaded trucks will be returning to New Boston Station each hour to pick-up more ash, the total volume of ash trucks passing any point on the study area road network will be approximately 5 trucks per hour or one every 12 minutes. Under conditions of maximum station load, the estimated number of truck loads of ash per day is 39. Thus under peak conditions, an average of 3.5 truck loads of ash per hour will be required. The total estimated truck volume added to the network under such conditions is 7 per hour, or one every 8 to 9 minutes.

Probable impacts due to increased truck activity from New Boston Station for the base year are shown in Table 8.2-3. Increases due to ash truck traffic on total traffic volumes for the various designated truck routes are relatively low, ranging from a 0.3 to 2 percent increase under average loading conditions. Under maximum loading conditions, the increase in total traffic is between 0.4 and 2.9 percent. The greatest percent increases are observed on East First, West First, and West Second Streets where the average daily total traffic volumes are relatively low. The anticipated impact of ash transport trucks from New Boston Station on truck traffic, under average and maximum conditions, results in daily increases of 2.8 to 9.8 percent, and 4 to 14.2 percent, respectively.

The three instances where truck traffic volume increases would be greater than 7 percent are locations with relatively low traffic volumes and excess capacity.

Based on these relatively insignificant increases in truck traffic along any of the designated truck routes, impacts on LOS for the major intersections identified above would be negligible during the peak hours. Likewise, for the off-peak hours, when most of the truck traffic associated with ash removal would be on the road, total hourly volumes of 5 to 7 vehicles traveling to and from New Boston Station represent a minimal impact.

In terms of safety, the added number of trucks would not impose a significant increase in the accident risk factor along any truck route. Future improvements in the road network are expected to further minimize accident risks.

Air quality impacts due to the operation of ash trucks in the vicinity of New Boston Station will be minor. Exhaust emissions from diesel engines have the same general characteristics as gasoline engine exhaust. However, diesel engines allow for more complete combustion than gasoline engines and, as a result, hydrocarbon and carbon monoxide (CO) emission rates are lower. Emission rates for nitrogen oxides (NOx) are higher from diesel engines because of the high temperatures and the amount of oxygen involved in diesel combustion, as compared to gasoline combustion. During peak-plant conditions, daily emissions from the ash hauling trucks are estimated to be in the range of 1 to 10 percent of the emissions from total vehicle traffic in the study area for particulate matter, NOx, and sulfur dioxide (SO_2), and 0.1 to 1.5 percent for CO and hydrocarbons. The impact of this emission increase on existing ambient air quality is expected to be minimal. During the transportation of the ash, no fugitive particulate matter emissions are expected since the ash will be wet and covered, or dry in tank trucks, and all trucks will be washed prior to leaving the site.

Noise impacts due to the operation of ash trucks in the vicinity of New Boston Station will be minor. The additional truck volume due to ash transport vehicles represents a small increase in the truck traffic on East First, West First, and Summer Streets (typically in the order of 1000 trucks per day), and will not result in noticeable change in daytime noise levels in the area.

Rail Transportation

Rail freight service to South Boston is provided by Conrail and is available in the vicinity of New Boston Station along East First and West First Streets. Use of the rail line is subject to interference from vehicular traffic because the tracks are embedded in the pavement. Trains currently run at night to avoid truck and commuter traffic.

Limited space available onsite and the layout of station facilities do not permit a workable arrangement for rail cars and roadbed. In addition, transport of ash by rail from New Boston Station would bring the train engine and rail cars close enough to the nearest residences to result in noise pollution as defined in the City of Boston Regulations for the Control of Noise (1975).

Based on rail freight service on West First and East First Streets in 1983, transport of ash by rail would also represent a significant increase in rail traffic and incursion onto a section of track not currently in use. Since the impact of ash transport by train would be significant on the surrounding area, BECO considers the transport of ash by rail an unacceptable option. Further discussion of the conditions which preclude the use of rail for transporting coal ash is contained in Appendix E.

Barge Transportation

Mooring and dock facilities at New Boston Station will be capable of handling coal vessels and ash barges. If water transportation is used, it is expected that one 5000-ton barge every 7 to 11 days will be required for ash transport. As shown in

Appendix E, ash transport by barge would add a small number of vessel trips to an already low level of use in the Reserved Channel.

Environmental considerations associated with ash transport by barge are discussed in Appendix E, Section E.5. No adverse impacts have been identified. The movement of barges by tugboat is not expected to generate any noise impacts, and the impact of exhaust emissions from the transport of approximately one barge per week is insignificant. In addition, no fugitive particulate matter emissions are expected since the ash will be moist.

8.2.2 Alternatives to Ash Disposal - Ash Reuse

There exists the opportunity to use a great deal of the ash that will be generated in the converted units. Possible uses for fly ash include feed-stock for cement clinker production, concrete adder in concrete products, structural fill, as a raw material for aggregate production, and other miscellaneous uses. Bottom ash is used as road base, in bituminous concrete, as an abrasive, and other miscellaneous applications. Ash is also used as a sanitary landfill cover in Massachusetts.

The potential for utilizing ash as a resource rests upon three factors:

- Maintaining quality control of the ash
- Creating a market for the ash
- Eliminating artificial barriers to ash reuse.

Quality control of the ash produced in the combustion of coal is a necessity. If the ash meets quality specifications, it will be due to efficient control of all factors influencing the combustion of coal. Quality control should not present unreasonable problems.

Creating a market ash will require a corporate commitment to educate potential end users of ash to the benefits and costs of ash use by category of application. A program of education and joint testing of ash in various applications will have to be developed if a market is to be effectively created.

Considering the potential savings inherent in an effective ash marketing program, a commitment to continue developing a full-scale ash marketing program appears beneficial.

Eliminating artificial barriers to the use of ash requires a commitment to joint efforts by BECO and DEQE, as well as other branches of state government. This commitment would take the direction of stimulating changes in specifications to allow and promote the use of ash as a substitute for other, more costly materials. With the many cooperative efforts between industry and government evolving in today's economy, such a commitment should prove achievable.

If the constraints which affect the utilization of ash can be offset, BECO could expect to annually market about 178,000 tons of ash. Although optimistic by national standards and given regional material constraints, marketing such a quantity is a realistic goal. The market estimate quoted is the result of an ash-marketing survey summarized in Tables 8.2-4 and 8.2-5, and included as Appendix F.

8.2.3 Long-Term Disposal Commitments

As stated in Section 8.2.1, it is BECO's long term strategy to develop a dedicated site for the storage/disposal of coal ash. The four potential sites discussed in Section 8.2.1.3 have been identified as desirable for development. BECO, however, does not plan on pursuing further investigation of these sites until after a final decision to convert to coal is made.

If an affirmative decision to convert to coal is made, the final phase of the site selection process will begin. Included in the final phase will be:

1. Topographic Mapping

   A topographic map of each of the four coal ash storage/disposal sites will be prepared.

2. Geohydrologic Investigation

   A geohydrologic investigation of each proposed site will be conducted to characterize the geology and groundwater conditions at the site.

3. Ecologic Reconnaissance

   Plant life (flora) and animal life (fauna) at each site will be characterized.

4. Preliminary Design of the Storage/Disposal Facility

   A preliminary design of the facility will be developed including all the elements of a properly designed coal ash storage/disposal site.

5. Operation Planning

   All phases of facility operations will be outlined.

6. Environmental Review

   A complete environmental summary review including baseline environmental conditions, environmental impacts, and measures to mitigate the environmetal impacts will be made.

Upon completion of the site selection phases of the project, one or two sites will be selected as final candidates for the licensing efforts.

8.2.4 Wastewater Treatment Sludge and General Refuse Disposal

8.2.4.1 Station Wastewater Treatment Sludge (Solid Wastes)

Treatment of New Boston Station liquid wastes will generate wastewater, solid waste, or sludge. The wastewater treatment sludges produced after the coal conversion and wastewater treatment system modifications are expected to be similar in composition to the sludges produced prior to conversion, although greater in quantity. The two types of sludge produced will be equalization pond sludge and vacuum filter metal hydroxide sludge.

Solids retained in the wastewater treatment equalization ponds will be removed, as required, by wet vaccuum techniques and transported for disposal offsite in an appropriately licensed landfill.

Solids collected in the clarifier after the precipitation of metals and solids will be dewatered by a vaccuum filter and disposed of appropriately.

Solids retained in the coal pile runoff ponds will be composed of coal fines, which will be returned to the coal pile.

Sludge Quality

Station wastewater treatment sludge from the vaccuum filter is a predominantly metal hydroxide sludge. The elemental composition of this sludge is dependent on the soluble and insoluble metal concentrations in the waste streams entering the metals precipitation treatment process. This process is described in Section 6.2.8.

The station wastewater treatment sludge removed from the clarifiers by vaccuum filtration will be dewatered to approximately 35 percent solids (by weight). At the expected percent solids, the sludge will be a dense cake suitable for truck hauling and readily handled as a solid.

In accordance with EPA and DEQE regulations for hazardous wastes, all postconversion sludges will be tested to determine if they are hazardous or special wastes. Based on the quality of sludges currently being generated at New Boston Station, the sludges are expected to be nonhazardous, but in the Special Waste category.

Sludge Quantity

The current quantity of wastewater treatment sludge generated at New Boston Station is presented in Section 4.7.6. The estimated postconversion wastewater treatment sludge quantity will range from approximately 57 cubic yards per week to 225 cubic yards per week, with an expected long-term average of 90 cubic yards per week, or 4680 cubic yard per year.

Wastewater Treatment Sludge Disposal

The wastewater treatment system sludge will be handled, transported, and disposed of in accordance with all applicable federal regulations issued pursuant to the Resource, Conservation and Recovery Act (PL94-580), which may include 40CFR Parts 122, 124, 261, 262, and 263, and all applicable state regulations issued pursuant to state solid and hazardous waste laws MGL c.16, Section 18-24B; MGL c.111, Section 150A; MGL c.21, Section 43; and MGL c.21C, which may include 310CMR Section 19 and Section 30, as discussed in detail in Section 3. The regulations which apply depend on the characteristics of the sludge, which will be determined by testing sludge quality after station conversion to coal-fired operation as discussed in Section 3.

8.2.4.2 General Refuse

The quantity and quality of New Boston Station's general refuse will not be appreciably changed by station conversion from that described in Section 4.7.6.

8.2.5 References

Dvorak, A.J. et al. Impacts of Coal-Fired Plants on Fish, Wildlife, and their Habitats. U.S. Department of the Interior. Fish and Wildlife Service Report, FWS/OBS-78/29. March 1978.

EPRI. (GAI Consultants, Inc. DiGioia, A.M.) Coal Ash Disposal Manual. Final Report for Project 1404-1, December 1979.

TABLE 8.2-1

COAL CONVERSION ASH DISPOSAL PARAMETERS

	New Boston Station
Coal Consumption (100% Station Load)	
Per Unit (tons/hour)	138
Total (tons/hour)	276
Coal Consumption (70% Average Annual Capacity Factor)	
Total (tons/year)	1,692,442
Ash Content of Coal	9%
Ash Generation Per Year (ton)	152,000
Fly Ash (80%)	122,000
Bottom Ash (20%)	30,000
Ash volume (acre-feet/year)	
@ 75 lb/cu ft - total	93
- fly ash	75
- bottom ash	18

TABLE 8.2-2

SUMMARY OF MOISTURE, ASH, SULFUR, AND HEAT CONTENT OF COAL FROM SOME MAJOR COAL-PRODUCING SEAMS IN THE EASTERN UNITED STATES

Region/State	Seam	Moisture (%)		Ash (%)		Sulfur (%)		Heat (Btu/1b)	
		Range	Avg	Range	Avg	Range	Avg	Range	Avg
Northern Appalachian									
West Virginia	Pittsburgh	-	2.9	4-20	7 (M)	0.6-14	2.2 (M)	11,400-14,800	13,800 (M)
Pennsylvania	Pittsburgh	1.1-3.9	2.5 (MR)	4.2-10.8	7.5 (MR)	0.7-3.3	2.0 (MR)	13,040-14,340	13,690 (MR)
Southern Appalachian									
Eastern Kentucky	Upper Elkhorn #3	-	3.2	-	3.9	-	0.9	-	14,200
Tennessee	Upper Elkhorn #3 (Jellico)	2.0-7.6	4.8 (MR)	1.9-10.5	6.2 (MR)	0.7-3.2	2.0 (MR)	12,630-14,290	13,460 (MR)
Virginia	Upper Banner	1.8-2.2	2.0 (MR)	4.7-5.8	5.3 (MR)	0.5-0.7	0.6 (MR)	14,600-14,870	14,737 (MR)
Alabama	Mary Lee	1.2-4.0	2.6 (MR)	4.9-19.8	12.4 (MR)	0.5-2.6	1.6 (MR)	11,570-14,700	13,135 (MR)
Eastern Interior									
Illinois	(No. 5) Harrisburg-Springfield	4-18	11 (MR)	8-12	10 (MR)	2-5	3.5 (MR)	10,100-12,700	11,400 (MR)
Indiana	(No. 5) Springfield	-	-	5-30	12	0.7-7.3	3.3	9,100-14,000	12,800
Western Kentucky	(No. 9) (No. 5 111)	-	5.0	-	10.5	-	3.15	-	12,940

NOTES:

M - Median
MR - Midrange

SOURCE:

Dvorak, A. J. et al. Impacts of Coal-Fired Plants on Fish, Wildlife, and Their Habitats. U.S. Department of the Interior. Fish and Wildlife Service Report, FWS/OBS - 78/29. March 1978.

TABLE 8.2-3

ESTIMATED IMPACT OF ASH TRANSPORT TRUCKS ON AVERAGE DAILY TRAFFIC IN 1987

	Adjusted 1987 Average Daily Traffic (% Trucks)	Estimated 11-Hr Traffic Volumes (2)		% Increase of Traffic Due to Ash Transport Trucks			
				Average Round Trips - 54		Maximum Round Trips - 78	
Road Link (1)		Total	Truck	% of Total	% Truck	% of Total	% Truck
1. Northern Avenue Bridge	32,130 (3) (9)	21,850	1,950	0.3	2.8	0.4	4.0
2. Congress Street at Fort Point Channel	12,640 (3) (15)	8,600	1,300	0.6	4.2	0.9	6.0
3. Summer Street at Fort Point Channel	29,990 (3) (9)	20,400	1,850	0.3	2.9	0.4	4.2
4. Summer Street	25,780 (3) (8) (5)	17,550	1,400	0.3	3.9	0.4	5.6
5. D Street	12,380 (3) (13)	8,400	1,100	0.6	4.9	0.9	7.1
6. East First Street West of I Street	3,931 (4) (26)	2,650	700	2.0	7.7	2.9	11.1
7. West First Street West of D Street	4,671 (5) (55)	3,200	1,750	1.7	3.1	2.4	4.5
8. West Second Street	5,329 (5) (15)	3,600	550	1.5	9.8	2.2	14.2
9. Broadway Bridge	24,069 (4) (10)	16,350	1,650	0.3	3.3	0.5	4.7
10. Broadway	14,824 (5) (11)	10,100	1,100	0.5	4.9	0.8	7.1
11. Dorchester Avenue South of A Street	24,700 (4) (5)	16,800	850	0.3	6.4	0.5	9.2
12 Southampton Street	15,852 (5) (14)	10,800	1,500	0.5	3.6	0.7	5.2

NOTES:

1. Locations of roadways shown in Figure 8.2-2
2. 11-Hr traffic volumes are 68% of total ADT
3. Vanasse/Hangen 1982 - see Appendix E references
4. Mass DPW et al 1982 - see Appendix E references
5. Fay et al 1980 - see Appendix E references

TABLE 8.2-4

SUMMARY OF FLY ASH REUSE POTENTIAL

Use Category	Potential Tons/Year	Annual Estimated Gross Revenue	Annual Disposal Cost Savings
Cement and Concrete	144,000	$1,008,000	$595,000
Structural Fill	2,000	-	10,000
Miscellaneous	3,000	-	13,000
Total	149,000	$1,008,000	$618,000

TABLE 8.2-5

SUMMARY OF BOTTOM ASH REUSE POTENTIAL

Use Category	Potential Tons/Year	Annual Estimated Gross Revenue	Annual Disposal Cost Savings
Road Construction	6,000	$ 12,000	$ 25,000
Abrasive	23,000	230,000	95,000
Total	29,000	$242,000	$120,000

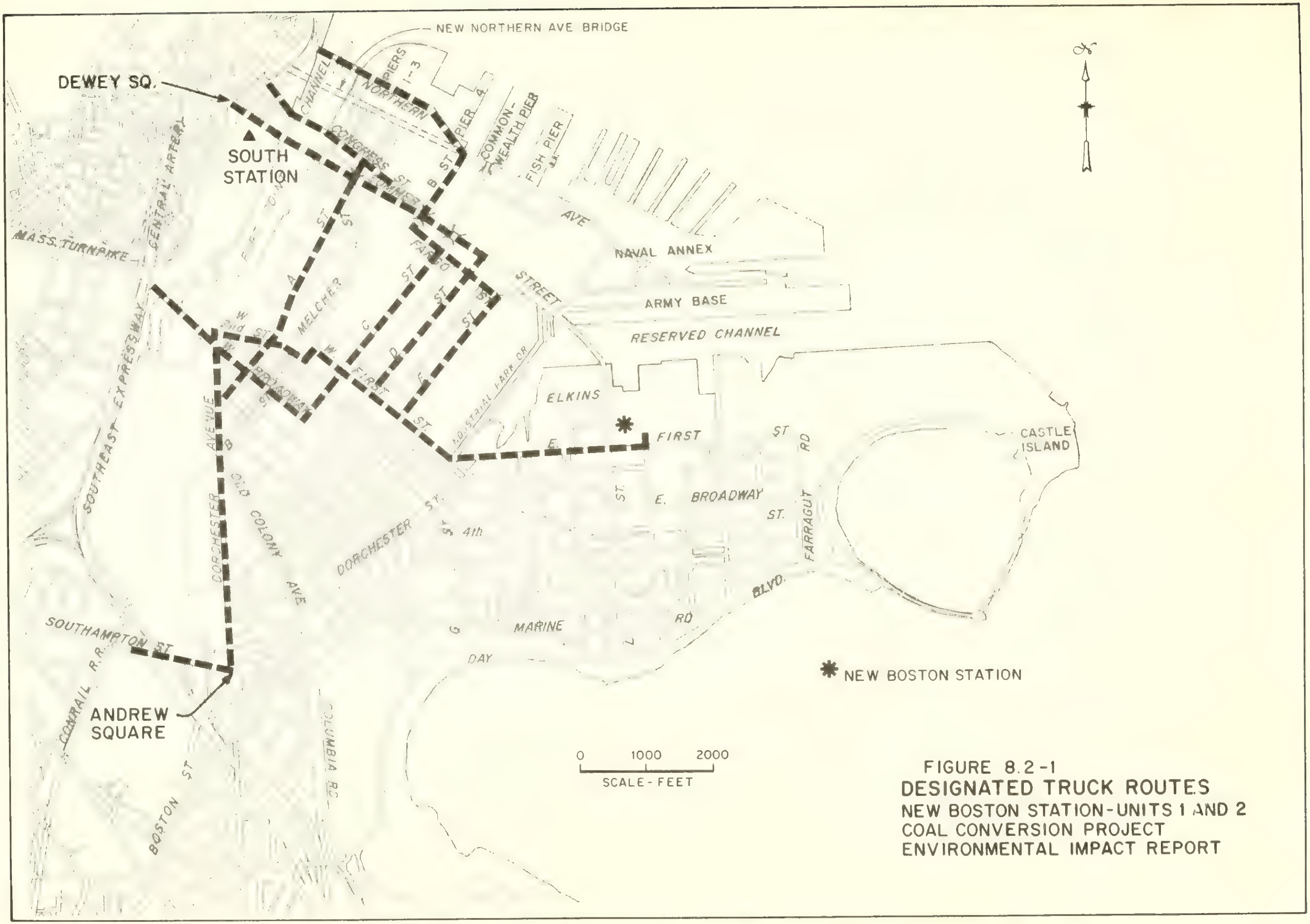
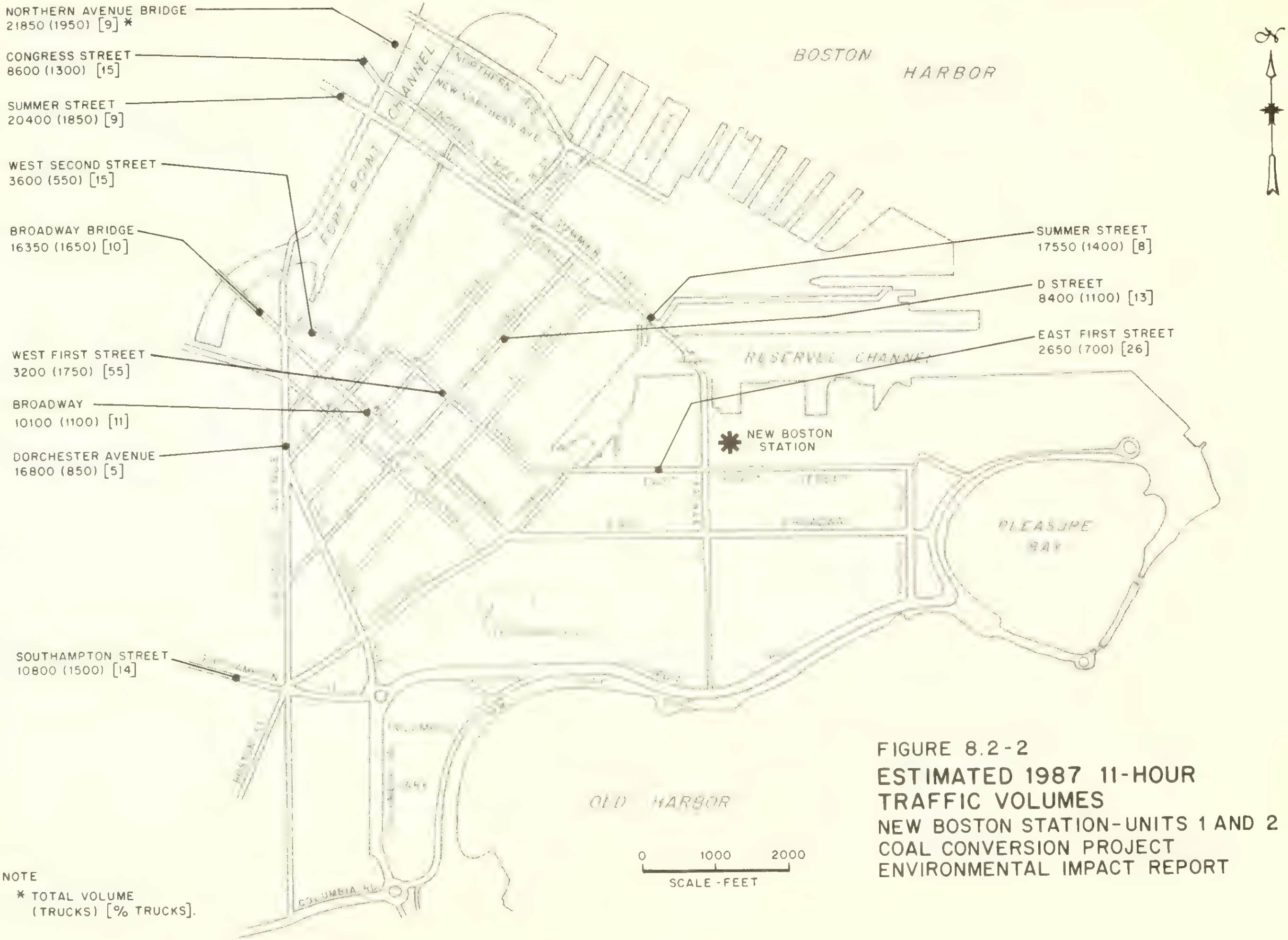


FIGURE 8.2-1
DESIGNATED TRUCK ROUTES
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

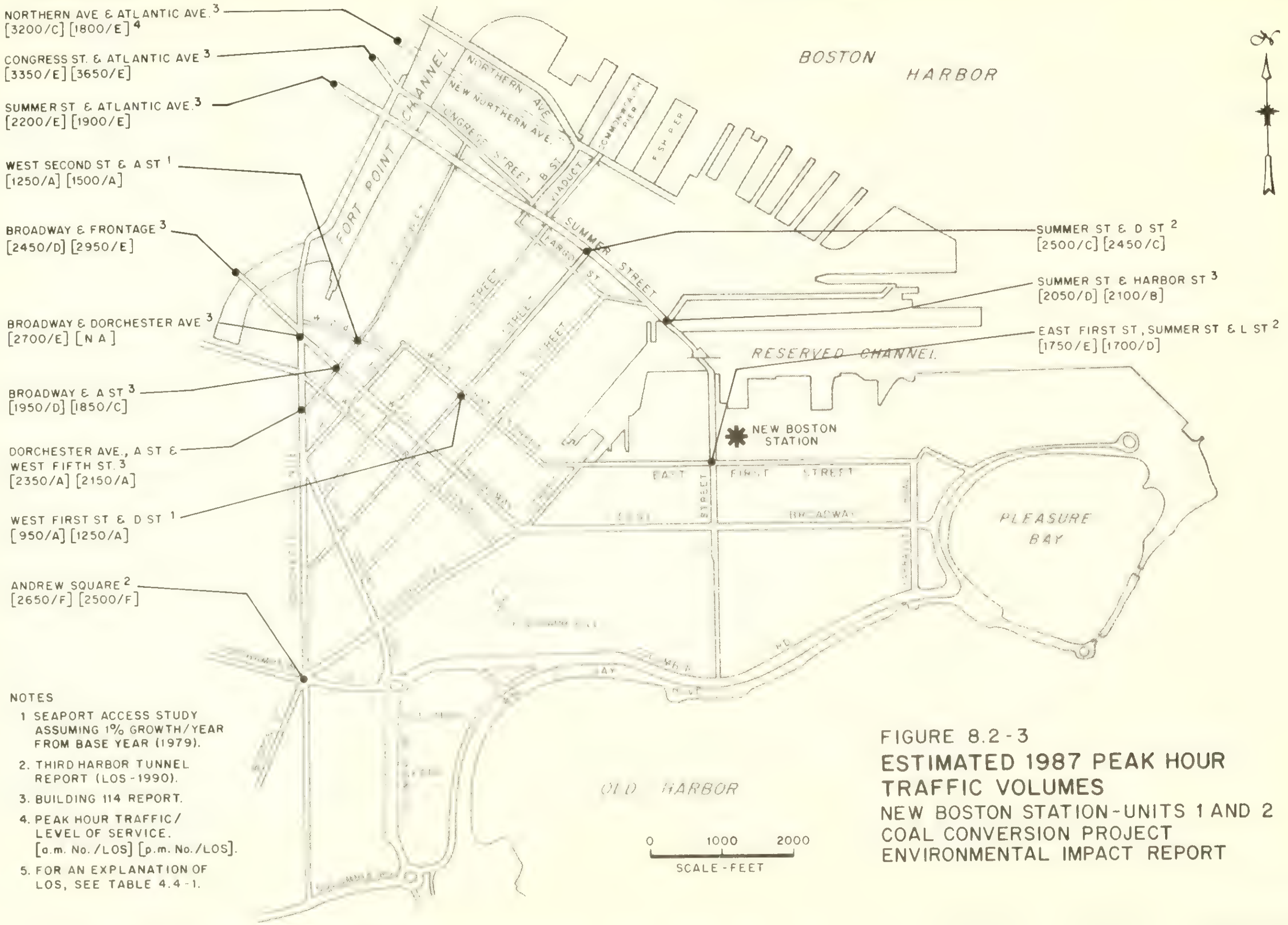


NOTE
* TOTAL VOLUME
(TRUCKS) [% TRUCKS].

FIGURE 8.2-2

ESTIMATED 1987 11-HOUR TRAFFIC VOLUMES

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT



NOTES

1 SEAPORT ACCESS STUDY ASSUMING 1% GROWTH/YEAR FROM BASE YEAR (1979).

2. THIRD HARBOR TUNNEL REPORT (LOS - 1990).

3. BUILDING 114 REPORT.

4. PEAK HOUR TRAFFIC/ LEVEL OF SERVICE. [a.m. No./LOS] [p.m. No./LOS].

5. FOR AN EXPLANATION OF LOS, SEE TABLE 4.4-1.

FIGURE 8.2-3

ESTIMATED 1987 PEAK HOUR TRAFFIC VOLUMES

NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

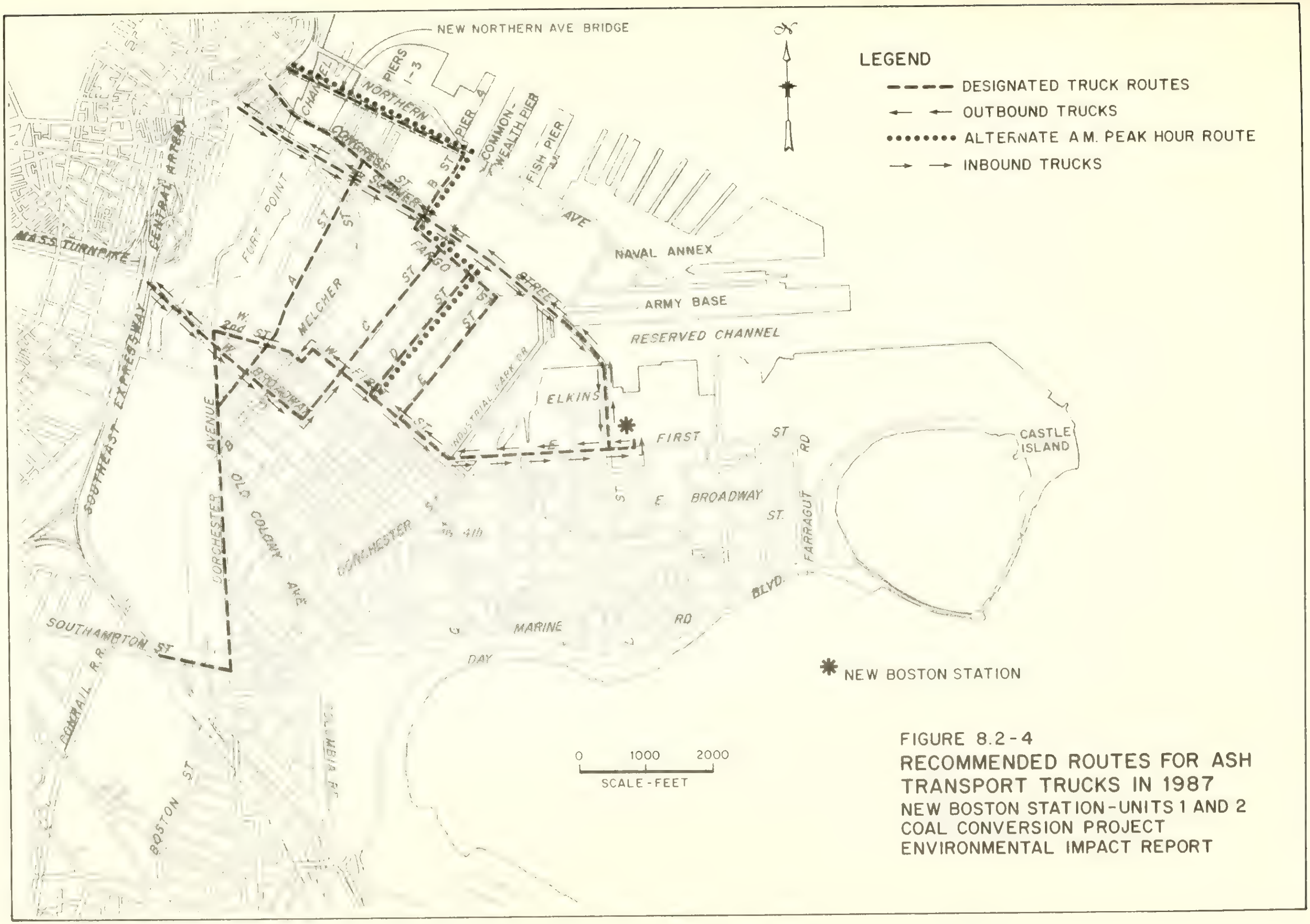


FIGURE 8.2-4
RECOMMENDED ROUTES FOR ASH TRANSPORT TRUCKS IN 1987
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

SECTION 9

ALTERNATIVES TO THE PROPOSED PROJECT

9.1 NO CHANGE

The "no change" alternative is to continue burning residual fuel oil at New Boston Station for its remaining operating life. Existing economic and environmental conditions would remain unchanged. Existing socioeconomic conditions are included in Section 4. Existing environmental conditions which include New Boston Station impacts are described in Section 5. Air pollutant emissions from the existing station are described in Section 7.1.

This alternative to domestic coal firing, as proposed, would not allow Boston Edison Company (BECO) to offer fuel cost savings to customers or reduce its dependency on unstable sources of fuel oil. BECO's present level of such dependence is 70 percent. The security of electric power generation which depends to this degree on a single fuel source (oil) is at great risk because of the instability and uncertainty of the supply sources. These factors are best illustrated with historical cost data presented in Figure 9.1-1. Although prices currently appear stable, future disruptions in supply and rapid price escalation could occur at any time as they have over the last decade.

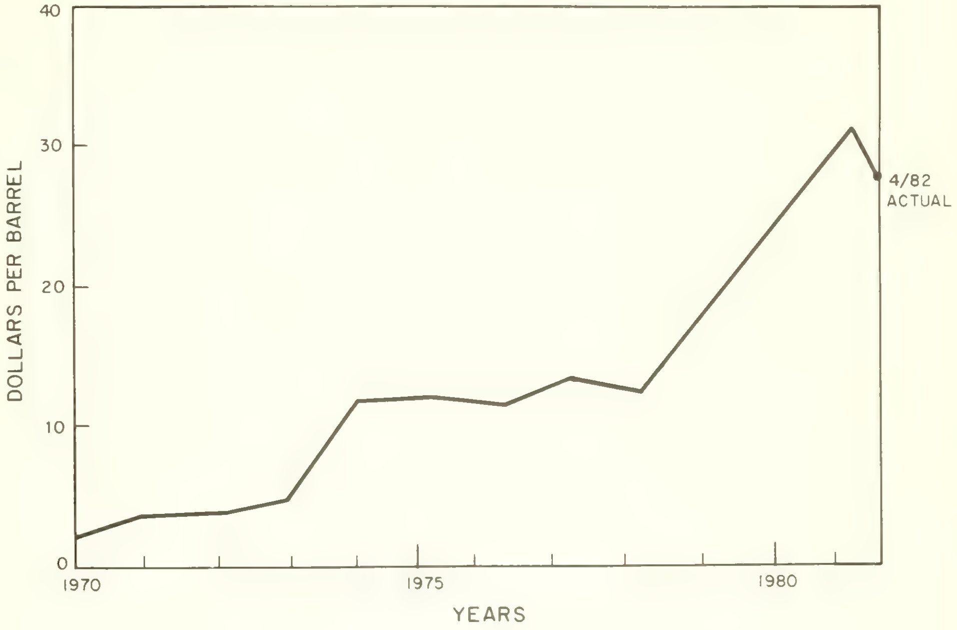


FIGURE 9.1-1

HISTORICAL PRICE OF BECO FUEL OIL

NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

9.2 NEW CHIMNEY WITH 2.2 PERCENT SULFUR OIL

A possible alternative to the coal conversion is to switch to a higher sulfur content fuel oil, i.e., 2.2 percent sulfur, in conjunction with the addition of a new taller, 369-foot chimney and electrostatic precipitators designed for oil firing.

This 2.2 percent sulfur oil alternative to direct coal firing does not reduce Boston Edison Company (BECO) dependence on costly and unstable foreign sources of fuel oil supply. As a responsible public utility, BECO is obligated to provide electrical energy to its customers at reasonable cost. When compared to coal conversion, this alternative is not the least expensive method to generate electricity and thereby provide BECO customers with the greatest possible savings. Based on the latest fuel oil price forecasts, it is estimated that savings associated with burning 2.2 percent sulfur oil with tall chimneys and electrostatic precipitators at both New Boston and Mystic Stations, as compared to present operations, would be $245 million through the year 2000. The savings associated with coal conversion of the same units to a 1.5 percent sulfur coal could be as much as $2.9 billion over the same time period.

The estimates of savings mentioned above take into account the relative capital costs of this alternative and the coal conversion. The direct capital equipment costs of the addition of taller chimneys, oil-designed electrostatic precipitators, plus an allowance for funds used during construction is estimated to be $94 million for New Boston Station and $76 million for Mystic Station. The capital costs of the coal conversion of these stations is estimated to be $500 million for New Boston Station and $350 million for Mystic Station.

In comparing the environmental impacts of this alternative to those of the proposed coal conversion, it can be seen, as discussed below, that in some areas the impacts are essentially the same while in others the impacts of the alternative are different, but not significantly so.

Since 2.2 percent sulfur oil is equivalent to 1.5 percent sulfur coal in terms of pounds of sulfur per million Btu of heat content (i.e., 1.21 lb/MBtu), sulfur dioxide emissions for this alternative would be the same as for the proposed coal conversion. With the chimney height and flue gas characteristics essentially equivalent for both options, the plume dispersion characteristics will be similar, resulting in similar ambient ground level impacts. This alternative would also require that the State Implementation Plan (SIP) be revised to allow for the use of a higher sulfur fuel than is presently permitted.

As a result of the different combustion characteristics of the fuels, it can be assumed that nitrogen oxide emissions would be less with oil burning than with coal; although in either case, ambient air quality impacts will be minimal.

Assuming that this alternative would employ electrostatic precipitators designed for oil, the particulate emissions should be less than for the proposed coal conversion. Due to the diverse chemical composition of the fuels, there should be less overall trace metals emissions, but the emissions of certain metals, such as vanadium would be higher.

Since the ash content of oil is less than coal, the quantities of solid waste (fly ash and bottom ash) produced by this alternative would be less than the proposed coal conversion option, thereby reducing ash transportation and disposal impacts.

Noise impacts of the proposed coal conversion will be controlled to meet the city and state standards; therefore, the noise impacts of the two options should be equivalent.

With this alternative, coal piles would not be needed, and fuel storage space requirements would be less than with the coal conversion.

9.3 PROPOSED PROJECT WITH DIFFERENT COALS

Consideration is given in this alternative to the environmental effects of burning lower sulfur coals and lower ash content coals at New Boston Station. Discussion of the availability of lower sulfur and ash content coals compared to the proposed 1.5 percent sulfur coal and cost differentials associated with the burning of these alternative coals, are also provided. Reference is made to a comprehensive study demonstrating the corresponding significant reduction in both the supply areas and the amount of coal acceptable for the boilers proposed for conversion.

9.3.1 One Percent Sulfur Coal

The availability of 1 percent sulfur coal is generally less reliable due to the more limited reserves and supply areas of lower sulfur eastern bituminous coals. It has been estimated that there are 40 percent less reserves of 1 percent sulfur coal available to Boston Edison Company (BECO) than of 1.5 percent sulfur coal (REI 1982). In addition, these lower sulfur coal reserves are located at a greater distance from New Boston Station, potentially adding to transportation costs.

Utilization of 1 percent sulfur coal is a more costly alternative over the expected life of the facility than the proposed 1.5 percent sulfur coal. Normally, the lower the coal sulfur content, the higher the purchase price of coal. It is estimated that combustion of 1 percent sulfur coal would increase the cost of fuel by at least 5 to 8 percent over the life of the facility, as compared to the proposed 1.5 percent coal. This is based on 1982 contract coal prices and conservatively assumes no inflation. Contract coal prices (fob the mine, i.e., without transportation charges) list 1982 costs for 1 percent sulfur coal equal to $38.30 per ton, as compared to $36.00 per ton for 1.5 percent sulfur coal (REI 1982).

As an alternative means of obtaining lower sulfur coal, coal washing could be used. However, the level of coal washing necessary to reduce higher sulfur coal to 1 percent is both expensive and technically difficult to achieve (REI 1982).

The only benefit in using 1 percent sulfur coal is a reduction in the sulfur dioxide (SO_2) emission rate. Combustion of 1 percent sulfur coal at New Boston Station Units 1 and 2 would result in a combined SO_2 emission rate approximately one-third less than the estimated emission rate with the proposed 1.5 percent sulfur coal, since SO_2 emissions are proportional to the sulfur content of the coal. The SO_2 contribution to ambient ground level concentrations resulting from operation of the facility with the proposed 1.5 percent sulfur coal, described in Section 7.1.2, would likewise be reduced by approximately one-third, as all other parameters remain nearly constant. As with the proposed

1.5 percent sulfur coal, SO_2 impacts from burning 1 percent sulfur coal would meet ambient air quality standards by a wide margin. Emissions of all other pollutants with 1 percent sulfur coal are essentially equivalent to those with the proposed 1.5 percent sulfur coal. All ambient air quality standards would be met at all times under the 1 percent sulfur coal alternative.

9.3.2 0.7 Percent Sulfur Coal

Maintaining a continuous and reliable supply of 0.7 percent sulfur coal is questionable due to limited reserves of low sulfur eastern bituminous coal. Analysis of geologic data indicates that 50 percent less reserves of 0.7 percent sulfur coal are available to BECO than of 1.5 percent sulfur coal (REI 1982).

Firing 0.7 percent sulfur would result in a greater cost differential, over the life of the facility, than would the 1 percent sulfur coal alternative. Studies have shown the cost of 0.7 percent sulfur coal to be 7 to 11 percent more than the proposed 1.5 percent sulfur coal (i.e., \$39.30 per ton versus \$36.00 per ton, fob the mine, as of 1982) (REI 1982).

The level of coal washing necessary to reduce the sulfur content of higher sulfur coals to 0.7 percent may not be technically feasible due to limitations inherent in the chemical and physical properties of various types of coal (REI 1982).

As with the 1 percent sulfur coal alternative, the only benefit in burning 0.7 percent sulfur coal is a reduction in the SO_2 emission rate. Combustion of 0.7 percent sulfur coal at New Boston Station Units 1 and 2 would result in a combined SO_2 emission rate approximately 47 percent of the emission rate with the proposed 1.5 percent sulfur coal. Similarly, SO_2 contribution to ambient ground level concentrations would be reduced proportionately since all other parameters are expected to remain nearly constant. Emissions of all other pollutants, including particulate matter (PM) would not change significantly under the 0.7 percent sulfur alternative. However, a larger precipitator would be required to maintain the same collection efficiency when firing 0.7 percent sulfur coal. Lower sulfur content coals have ash with higher resistivity, which necessitates a larger precipitator to obtain equivalent performance. As with the proposed 1.5 percent sulfur coal, all ambient air quality standards would be met under the 0.7 percent sulfur coal alternative.

9.3.3 Lower Ash Content Coal

The combustion of lower ash content coal at New Boston Station Units 1 and 2 would not affect the design particulate matter emission rate of 0.08 lb/MBtu. Coals with lower ash content can be obtained either directly from mines, or as a result of washing of higher ash content coal. However, similar to lower sulfur coals, lower ash coal is increasingly more expensive and generally less available. Regardless of the coal ash content, particulate matter emissions controlled by an electrostatic precipitator would not violate existing standards and predicted ambient impact concentrations would be approximately the same as those addressed in Section 7.1.2 for the proposed coal.

Lower ash content coal would, however, have an impact on solid waste production quantities. Coals having lower ash content will produce proportionately lesser amounts of ash for offsite disposal or reuse.

With regard to the effects of coal ash content on wastewater quality, the chemical properties of coal, a heterogeneous substance, are the result of the coal's origin. Variability may be found therefore among coals meeting the design specifications and even for coals with the same sulfur, heat, and ash content. The chemical constituents of coal pile runoff, bottom ash drainage, and wastewater treatment sludge are therefore likely to vary somewhat, regardless of the ash content of the coal fired. Existing environmental control measures for liquid waste streams at New Boston Station, which require only minor modification for coal conversion, are designed to meet applicable discharge limitations within the degree of variability described above.

9.3.4 Reference

Resource Engineering Incorporated (REI). Influence of Sulfur Content on Coal Availability and Coal Price. December 1982.

9.4 USE OF NATURAL GAS

Natural gas is currently not a viable year-round alternative fuel for Boston Edison Company (BECO) New Boston Station Units 1 and 2. This fact is primarily due to regional and local supply limitations and uncertainties associated with the cost of natural gas.

At present, Massachusetts is served by two natural gas pipeline systems, the Algonquin and the Tennessee, which together have barely sufficient capacity to meet current winter peak loads. The home heating market over the past few years has seen a significant shift to natural gas, both in new homes and in replacement furnaces, which has strained existing distribution systems during periods of extreme cold. Thus, no surplus is available during the winter home heating season. From BECO's discussions with Boston Gas Company with respect to the conversion of the oil-fired Mystic Station Unit 7, in Everett, Massachusetts, to gas-firing capability (which was accomplished in June 1982), the natural gas supply was found to contain no surplus for utility consumption on a full-time basis, even during the warmer months. In fact, there were only a few days in the summer of 1982 when the available gas supply was sufficient to meet the Mystic Unit 7 full load.

There are also local supply limitations in the South Boston area. There are existing high capacity gas lines near the Mystic Station in Everett which allowed for a rapid and relatively inexpensive connection from the plant to the gas supply system for the Mystic Unit 7 gas conversion. However, these high capacity lines do not exist near New Boston Station and would require the addition of substantial lengths of pipeline to feed the New Boston Station. This makes burning of natural gas at New Boston a less attractive option.

Within the energy industry there is a general consensus that natural gas prices will rise more quickly over the next few years than the prices of other fuels, including coal. The general concern relative to natural gas prices is having a negative effect on any commitment of capital resources to new pipeline facility projects, which further aggravates the supply situation. Liquified natural gas (LNG) is not considered a viable option because of its high cost, much higher than even that for low sulfur residual oil.

From an environmental viewpoint, natural gas would be a relatively clean-burning fuel for New Boston Station, compared to the present oil-fired operation and the proposed coal conversion. Particulate matter emissions would be approximately 30 percent of current oil-fired emissions or 13 percent of the projected coal-fired emissions. Sulfur dioxide emissions are negligible with natural gas, and nitrogen oxide emissions are comparable to those which occur with oil firing.

Most other environmental impacts would be comparable to or less than those currently experienced with oil firing, and certain waste products would be reduced. These include a reduction in the small amount of ash currently produced, as well as a reduction in wastes to the wastewater treatment system.

9.5 ALTERNATIVE OR ADDITIONAL ADVANCED POLLUTION CONTROL TECHNOLOGIES

9.5.1 Flue Gas Scrubbers

In this section, flue gas scrubbing at New Boston Station is considered. Three basic flue gas desulfurization (FGD) concepts are considered: wet scrubbing, dry scrubbing, and partial scrubbing. Brief descriptions of these scrubbing concepts are contained in Sections 9.5.1.1, 9.5.1.2, and 9.5.1.3.

The main advantage of installing an FGD system to treat the flue gas is that it allows a wider range of higher sulfur content (and cheaper) fuels to be burned while maintaining air quality standards. The disadvantages of an FGD system are numerous, however, and the principal ones are as follows:

- FGD systems are essentially large chemical plants which require large areas of onsite real estate, increased use of utilities and resources (such as water, steam, electricity, and high-grade limestone), increased use of fuel, and increased operation and maintenance expense

- Significantly larger quantities of solid waste are produced which require larger offsite areas for waste disposal

- An increase in local street traffic (truck transport) or in local waterways traffic (barge transport) would occur due to the incoming scrubber reagent and increased outgoing solid waste.

- Due to lower stack exit temperatures and water saturated flue gas, the dispersion of pollutants would be reduced by a decrease in plume rise.

- Utility experience with the reliability of FGD systems has historically been poor. Although statistically the reliability of FGD systems has been improving with expenditures of large operating and maintenance costs, FGD systems may still adversely impact the availability of the power plant.

- The total cost in 1983 dollars of a limestone FGD system is estimated to be on the order of $300 per kW (EPRI 1981). For the New Boston Station Units 1 and 2 capacity of approximately 760,000 kW, this translates to a cost of approximately $230 million. The estimated annual operating and maintenance cost is approximately 6 percent of the total installed capital cost or approximately $14 million.

For all the above reasons, the use of low sulfur coal has been selected for the New Boston Station coal conversion project. By burning this low sulfur fuel, ambient air quality sulfur dioxide (SO_2) standards are met by a wide margin, thereby preempting the need for an FGD system. Use of low sulfur coal will reduce the overall cost of the conversion project and, therefore, the cost of electricity to the consumer. It will also result in a more reliable production of electricity while not generating significantly greater amounts of waste which require transportation and offsite disposal. All coal conversion projects in the Commonwealth of Massachusetts have made similar decisions and are burning low sulfur coals without costly FGD systems or ambient standard violations.

9.5.1.1 Wet Scrubbers

There are several types of wet throwaway FGD systems commercially available. For a retrofit application such as a coal conversion, real estate availability is extremely limited. For this reason, a wet limestone forced oxidation FGD system producing a gypsum by-product is the best candidate since it does not require the additional systems to stabilize the sludge. A basic description of this system follows:

Flue gas enters the lower sections of multiple absorber spray towers and the limestone reagent enters through sprays located in the upper section of the tower. The flue gas is initially quenched to saturation and then is countercurrently contacted with the reagent slurry. The SO_2 reacts with the limestone to form calcium sulfite ($CaSO_3$) and calcium sulfate ($CaSO_4$) which collects in the bottom of the spray towers. The scrubbed flue gas passes through a mist eliminator and is discharged to the chimney. Forced oxidation of the $CaSO_3$ to $CaSO_4$, or gypsum, is accomplished by bubbling air through the slurry of reagent and waste products using an air sparging system. A waste slipstream is discharged for further dewatering and shipment to offsite disposal.

With regard to the SO_2 removal efficiency potential of wet scrubbers, utilities using wet scrubbers have demonstrated an increasing amount of successful operation utilizing this technology. Results show that the majority of commercially operable wet scrubber systems have been designed for SO_2 removal efficiencies of 80 to 92 percent, with actual emissions control on high sulfur content coals in the 80- to 90-percent range.

Considering all of the factors above, regarding FGD costs and operation, wet scrubbing is not recommended at New Boston Station. Instead, all SO_2 emission and ambient standards will be achieved by firing 1.5 percent sulfur coal.

9.5.1.2 Dry Scrubbers

Dry scrubbing is an alternative to wet scrubbing. The unique aspect of the dry scrubbing FGD process is that the water in the reagent slurry is evaporated by the flue gas leaving a dry powder, as compared to the wet sludge by-product of the wet throwaway FGD systems. Another major difference is that the dry scrubbing FGD process integrates the particulate collection system with the SO_2 removal equipment. The calcium-based products and the fly ash are collected downstream of the spray dryer in a fabric filter or an electrostatic precipitator.

Flue gas is distributed into the spray dryer through a gas disperser (inlet vanes) at the roof of the dryer. One or more atomizers, located in the roof or side of the dryer, atomize the lime slurry into fine droplets. The SO_2 is absorbed on the surface of the droplets to form calcium sulfites and sulfates. At the same time, the flue gas evaporates the water in the droplet to produce a dry mixture of sulfites, sulfates, and some unreacted lime.

The flue gas subsequently passes through a particulate collection system where the particulate mixture of fly ash and scrubber waste is collected for offsite disposal. The treated flue gas is exhausted to the chimney.

Commercial application of dry scrubbing systems at utilities is limited. Utilities and industries that do utilize dry scrubbers are operating with SO_2 removal efficiencies between 70 and 85 percent, which is lower than wet scrubbers. Dry scrubbing is not recommended at New Boston Station since all SO_2 emission and ambient standards will be achieved by firing 1.5 percent sulfur coal.

9.5.1.3 Partial Scrubbing

The concept of partially scrubbing the flue gas is not new. Many operating units today do not remove the maximum amount of SO_2 which could be removed.

There are several advantages to processing a portion of the flue gas at as high an SO_2 removal efficiency as possible and bypassing the remainder of the flue gas. The absorber modules can be sized for less than full flow, hence saving space and money. Also, the hot bypass flue gas can be used for reheat and therefore a reheat system is not required, resulting in a saving in capital cost and operating cost. The ductwork and chimney flues can be designed for a smaller amount of flue gas than with full-stream scrubbing since the heated ambient air is not added to the system. Although partial scrubbing offers some savings over full scrubbing, costs are still high and the negative aspects of full scrubbing, discussed above, apply to partial scrubbing systems as well.

Emissions of SO_2 under partial scrubbing are inversely proportional to the percentage of total flue gas being processed and the efficiency of the system. Solid waste production is proportional to the same parameters. Partial scrubbing can be designed to achieve a wide range of emission limitations. However, partial scrubbing is not recommended at New Boston Station since SO_2 emission and ambient standards will be achieved by firing 1.5 percent sulfur coal.

9.5.2 Baghouse Particulate Collectors

A fabric filter baghouse is a particulate collection system which uses parallel, cylindrical fabric bags to remove particulate matter from the boiler flue gas. The process is similar to a household vacuum cleaner. At periodic intervals the particulate matter or fly ash is removed from the bags and collected in hoppers located under the baghouse. This is usually performed by isolating a section of bags and blowing clean air in a reverse direction through the bags. From the hoppers the ash is conveyed pneumatically to the fly ash silos for storage prior to transport for offsite disposal.

Fabric filter baghouse systems have been successfully operated using low sulfur eastern coals. However, New Boston Station will retain the capability of firing No. 6 fuel oil as an alternative fuel, and baghouses are not recommended to remove oil ash because it has been shown to plug the filter material.

With regard to emissions of particulate matter during coal firing, baghouses can be designed to have about the same collection efficiency as electrostatic precipitators. Air emissions under the baghouse alternative during coal firing, therefore, are not a significant factor in assessing its viability. The operational problems associated with oil firing are by far the more significant reasons for the selection of electrostatic precipitators over baghouses for this project. Thus the control of particulate emissions to 0.08 lb/MBtu can be achieved during coal firing with either the proposed electrostatic precipitators or the baghouse system. No significant change in the amount of solid waste to be removed would occur under the baghouse alternative.

9.5.3 Fluidized Bed Combustion

Fluidized Bed Combustion (FBC) is a technology for burning a wide range of fuels cleanly and economically which may in the future prove suitable for utility power generation application. With this technology, high sulfur coal is burned in a bed of limestone suspended by an upflow of air, without the need for flue gas desulfurization systems.

In FBC, fuel and inert material (which may consist of ash, sand, alumina, etc) are suspended by an upflow of air in a combustion chamber such that the mass behaves like a fluid. Air is distributed beneath the bed via a perforated plate or nozzle system. The resultant enhanced mixing and turbulence allow combustion to take place at relatively low temperatures of 1500 to 1600°F, thereby minimizing ash slagging and fusion, volatilization of alkali, and NOx generation. Nitrogen oxides (NOx) emissions in the range comparable to oil firing (0.3 to 0.4 lb/MBtu) are feasible. A sorbent such as limestone may also be added to the bed to absorb sulfur from the fuel. SO_2 removal of 90 percent is possible. Resultant waste products are dry and relatively inert. PM emissions in the FBC process can be controlled by existing technologies such as baghouses or electrostatic precipitators.

Presently there are three major types of FBC boilers under development: atmospheric (AFBC), pressurized (PFBC), and circulating (CFBC).

AFBC is commercially available in industrial boiler sizes up to approximately 600,000 lb/hr steam generation rate, with several boiler manufacturers offering commercial guarantees. Additional development and testing in larger demonstration size units will be required prior to commercial availability of large electric utility AFBC boilers.

PFBC continues to be developed in the pilot plant scale and component test plant phase. Indications are that it may prove attractive at the utility scale when integrated in combined cycle with a gas turbine and a waste heat recovery boiler. However, large-scale demonstration of these plants is now required to completely prove the technology for utility application.

CFBC is a second generation variation on the AFBC concept currently being developed to commercial scale. CFBC holds the promise to make significant improvements over first generation AFBC.

At the present time, it appears that commercial FBC technology will not be available for New Boston Station in the time frame required. Full commercialization of the most near-term technology, AFBC, is not expected before the late 1980s for utility application.

9.5.4 Limestone Injection

Limestone injection generally has consisted of adding limestone to the boiler and collecting the particulate matter present as fly ash and calcium by-products, downstream in a spray tower. Injecting limestone directly into a conventional boiler was first attempted in the late 1960s and 1970s. Union Electric Company retrofitted a limestone addition system to its 140 MW Meramec Station Unit 2 in September 1968. The system was operated through June 1971. Kansas Power and Light's 125 MW Lawrence Station Unit 4 also began limestone injection during the same time period and operated with injection until September 1976. Other tests have been done by boiler manufacturers as well as utilities during this time period. These systems were able to achieve removal of up to 50 percent of the SO_2, however, operational problems made the overall system ineffective. In comparison to other SO_2 removal systems, SO_2 removal by limestone injection is not especially attractive.

Meramec Station Unit 2 and Lawrence Station Unit 4 both experienced similar operating problems. Fouling within the boiler area resulted in shutdowns. The boiler tubes were subject to erosion due to the limestone particles traveling at high velocities. In the area of the spray tower, sealing and plugging of most of the collection system components had occurred. Erosion and corrosion of spray tower internals were also responsible for shutdowns.

After several years of trying various means to improve component and system operations, both of these stations retired the limestone injection concept. With more widespread commercial application of wet and dry scrubbing technologies which offer the potential for greater SO_2 removal efficiencies, as described in Section 9.5.1, or with the use of low sulfur coal, interest in further development of limestone injection systems has been limited in recent years. Limestone injection is therefore not regarded as a commercially viable technology.

9.5.5 Special Controls for Particulates from Soot Blowing

The proposed electrostatic precipitators at New Boston Station are conservatively sized, based on inlet particulate (grain) loadings resulting from the use of a maximum percent ash in the lowest Btu coal and a fly ash to bottom ash ratio of 90/10 (compared to the expected ratio of 80/20). Increases in inlet grain loadings caused by sootblowing are expected to be insignificant compared to the normal inlet grain loading, and since the precipitators are conservatively sized, no special controls are required to meet design emission rates while soot blowing. Emissions of particulate matter will be in compliance with all provisions of Massachusetts visible emissions regulation [310CMR7.06(1)].

9.5.6 References

Electric Power Research Institute (EPRI). Economics of Four FGD Systems (EPRI CS-1677). January 1981.

9.6 PURCHASE ELECTRICITY

At present, the Boston Edison Company (BECO) and New England area energy mix is heavily weighted toward oil-fired sources, making the cost of electricity highly vulnerable to the price and availability of the supply of oil. This dependence can be reduced by either converting existing units to burn alternative fuels (i.e., the proposed coal conversion projects), purchasing energy from existing nonoil-fired units, or adding new nonoil-fired capacity to the BECO network (see Section 9.8).

BECO has pursued, and will continue to pursue these alternatives. Generally, the purchase of nonoil-fired capacity and energy is constrained by the availability of sources. Recently, BECO was able to enter into a contract with Canada's Hydro-Quebec Company to purchase as much hydroelectric power as possible. By the end of this decade, this will be equivalent to about 80 MW, increasing by an additional 270 MW in the 1990s.

In terms of the availability of coal-fired capacity, several companies have begun to convert, or indicated a desire to convert, some of their existing oil-fired units to coal. They are doing so to satisfy their own needs and have not offered that capacity for sale due to its low cost. Additionally, for the 1990s only two utilities in New England (i.e., Central Maine Power and Commonwealth Electric) are considering coal-fired units. While other units may be required in New England before the end of the 1990s, none have been proposed at this time. In the 1980s, only three major new units, all nuclear, are expected to be completed in New England. BECO does not anticipate a need for additional capacity in the 1980s when these units commence operation; and because of their high capital costs, purchasing capacity from these units would not yield the near-term economic consumer benefits that could be realized by the coal conversion of existing units.

Given the limited availability and high cost of nonoil-fired generation available for purchase, the conversion to coal of New Boston Station offers BECO and its customers the most timely (5-year lead time), economical, and reliable option for reducing oil dependency.

9.7 PHASE OUT NEW BOSTON STATION

Phasing out New Boston Station with a maximum capacity 760 MW as a means of reducing Boston Edison Company (BECO) oil dependency is not a viable option. In 1982, New Boston Station operated at a 69 percent capacity factor and provided approximately 36 percent of BECO's total energy requirement. To phase out this amount of generation without replacement would cause BECO to become significantly deficient in needed capacity. BECO would then have to contract for additional capacity (as discussed in Section 9.6) or pay a penalty to New England Power Pool (NEPOOL) for failure to meet its capacity requirements. Construction of new capacity to replace these units would be both expensive and time consuming (as discussed in Section 9.8).

9.8 CONSTRUCT NEW SUBURBAN OR RURAL FACILITY

Construction of a new coal-fired generating station outside the Boston area to reduce Boston Edison Company (BECO) oil dependency and supply new load requirements is technically feasible; however, it is severely handicapped by the 10- to 12-year lead time, the high capital costs, and the difficulties in selecting and licensing a new site. A need for this additional capacity would also have to be created by phasing out another generating facility which is not considered an attractive near-term option, as discussed in Section 9.7. It is also generally true that overall environmental impacts associated with constructing a new facility at a new site are considerably more than those associated with modernizing, refurbishing, and converting to coal at an existing site. Thus, pursuing the construction of a new generating facility, as opposed to a coal conversion, is the least desirable course of action for BECO at this time.

9.9 USE OF COAL/WATER MIXTURE

Coal/water mixture (CWM) is a slurry consisting of about 70 percent pulverized coal, 29 percent water, and 1 percent additive which is used to stabilize the mixture and promote flow. Though more viscous than No. 6 fuel oil, it can be handled using the same types of piping and storage systems used for oil, with some equipment modifications. CWM has only about one-half the heating value of No. 6 oil, but has burned well in tests in small boilers. Although CWM is not currently used in the utility industry, the technical and economic feasibility of CWM is under review by a number of companies, including Boston Edison Company (BECO).

From an environmental standpoint, the main advantage of CWM over pulverized coal firing is the removal from the power plant site of the impacts associated with coal unloading and handling. An additional benefit of CWM may be a slightly lower level of ash production, due to coal washing during mixture preparation, which would tend to slightly reduce solid waste transportation and disposal impacts.

CWM has not been burned in a large boiler and there is no assurance that the favorable results from short duration, small scale tests are applicable to continuous, large scale, utility boilers. A number of questions about CWM combustion remain to be answered. These include: will the mixture burn in large utility boilers with a stable flame; what is the feasibility of large scale manufacture as a commercial fuel; what, if any, capacity loss will be experienced in the generating unit; and what are the incremental fuel and equipment costs over direct coal firing? Answers to these questions are not likely to be available for at least 2 years.

Due to the uncertainties associated with CWM, and the fact that it is still in the developmental stage and not commercially available, CWM is not a feasible alternative to direct coal firing at New Boston Station at this time.

SECTION 10

HEALTH IMPACTS OF PROPOSED ACTION AND ALTERNATIVES

10.1 SUMMARY

This section is an analysis of the potential impacts on public health due to the proposed coal conversion of New Boston Station. A brief description of methodologies used to evaluate health impacts is first presented. The potential health effects are best assessed on a comparative basis, since the present state of knowledge does not permit an accurate quantification of the absolute health effects associated with various air pollutants and individual sources can not be identified from ambient air quality. Individual pollutants for which National Ambient Air Quality Standards (NAAQS) exist are compared to these standards. Other pollutants produced by coal combustion are evaluated in terms of known effects on humans and background concentrations. Predicted contributions to existing ground level concentrations by the New Boston Station after conversion will not cause any violation of primary NAAQS which are established to protect public health. Noncriteria pollutants, for which NAAQS do not currently exist, emitted by the station will cause only small increases in comparison to the background concentrations. The predicted ambient concentrations of several pollutants will be lower than before the coal conversions.

One important aspect in the evaluation of the potential effect that pollutants have on public health is the population in the area of impact. While the areas of greatest impact after conversion are predicted to be some distance from the station, concern has been raised by the local community that they may be adversely affected. Section 10.3 is an analysis of the past and present health status of the South Boston community. The information herein is based on published vital statistics data, which enables conclusions to be reached about community health status. A community health survey will also be conducted to provide additional information about the current health status of the community.

A discussion of the effects of alternatives to the proposed action is also included. It compares relative effects that other alternatives to the proposed action would have on ambient air quality.

This section concludes that the minor changes predicted in air quality associated with coal conversion will not cause significant health effects or changes in the general health status of the population residing in the area of impact. In addition, the health effects of the various alternatives to coal conversion would not vary significantly from those associated with the proposed coal conversions.

10.2 METHODOLOGY FOR EVALUATION OF HEALTH IMPACTS

The three major types of air pollution from fossil fuel-combustion sources are as follows:

1. The sulfur oxide and particulate complex generated by the combustion of sulfur-containing fossil fuels, especially coal and oil. The sulfur oxide component includes sulfur dioxide (SO_2), sulfuric acid, and sulfate aerosols. The particulate component consists of soot, fly ash, metallic oxides, and suspended sulfates and nitrates.

2. Photochemical oxidants formed in the atmosphere from the chemical reaction between solar radiation and nitrogen oxide and hydrocarbons. Combustion in coal and oil-fired power plants produces small amounts of hydrocarbons relative to motor vehicle emissions, but contributes larger amounts of nitrogen oxides.

3. Trace emissions of heavy metals such as lead, cadmium, arsenic, and mercury.

The present state of knowledge does not permit an accurate quantification of absolute health effects associated with various air pollutants. The present analysis utilizes a comparison of projected air quality under coal conversion and present air quality. This differential in air quality is then compared to either standards for criteria pollutants, or documented health effects at air quality levels predicted under coal conversion for noncriteria pollutants. An assessment of the current health status of the community is also made to determine if the community is at risk, by comparison to other communities. For some pollutants, threshold levels below which effects are not discernible (or negligible compared to other factors such as smoking) have been demonstrated.

The impacts of coal combustion products on human health are dependent on many factors. The body's response to these impacts may differ according to the age and condition of the exposed individual, the nature and concentration of the specific pollutant or mix of pollutants, and the duration of exposure.

As a part of other studies of health effects and air pollution, various mathematical models have been developed to relate the exposure (ambient air quality) and reponse (some measure of health effect such as morbidity or mortality). These models have been developed by researchers to investigate the general relationship between air pollution and human health, and are therefore not applicable to specific application of the effects of a single source and its potential effects on the health status of the surrounding community. The following discussions describe the limiting features of exposure - response models for addressing health effect questions for the coal conversion of New Boston and Mystic Stations.

These exposure-reponse relationships are usually estimated in terms of mortality and morbidity, with mortality frequently used because it is a discreet event for which relatively complete records are kept. However, exposure-response models have limited validity for predicting the effects of a single pollutant from a single source as it is usually impossible to relate fatalities to a specific cause such as air pollution. These models create the false impression that even minor reductions in air pollution would result in "lives saved". There is no validity to a general conclusion such as this.

Epidemiologic studies, while providing the most realistic basis for study, are subject to much uncertainty due to confounding effects of age, occupational exposure, cigarette smoking, and other factors which naturally occur in there studies. Therefore, conclusions from one study do not necessarily reflect the effects in another study.

The U.S. Environmental Protection Agency (EPA) has promulgated primary (human health-based) National Ambient Air Quality Standards (NAAQS) for the major pollutants emitted from fossil fuel facilities. The primary NAAQS are based on air quality criteria which, in accordance with Section 108(a)(2) of the Clean Air Act, must "accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on human health ... which may be expected from the presence of such pollutant(s) in the ambient air." Additionally, the "setting [of] such air quality standards ... should consider and incorporate not only the results of the research summarized in the air quality criteria documents, but also the need for margins of safety." (U.S. Congress 1970)

As provided for in the Clean Air Act, both the criteria and the national standards are to be reviewed and revised, as appropriate, at 5-year intervals, beginning not later than December 31, 1980 [Clean Air Act Section 109(d)(1)]. The criteria documents are currently being revised and the ambient standards will be reviewed in light of these criteria.

Implicit in the primary NAAQS is the concept of the threshold, below which no health effects due to a specific pollutant will occur. In setting the primary NAAQS, the intention is to first identify a threshold below which there are no reported adverse health effects, next adopt a margin of safety, and then set the standard.

Although the adequacy of the primary NAAQS continues to be discussed, critical reviews of these standards have concluded that the present primary NAAQS are adequate to protect the health of the public (Ferris 1978; American Thoracic Society/American Lung Association 1978). Some have argued that the standards are too stringent (Holland et al 1979).

The pollutants that are currently included for ambient air quality standard setting under the Clean Air Act, which are referred to as criteria pollutants, are sulfur oxides, total suspended particulate matter, nitrogen oxides, carbon monoxide, photochemical oxidants (ozone), and lead. Other air pollutants of concern for which no criteria documents have been written and which are, therefore, not regulated by primary NAAQS are referred to as noncriteria pollutants. The noncriteria pollutants that will be addressed in this document are respirable particulate matter (RPM), trace elements, radionuclides, polycyclic organic matter (POM), sulfates, and volatile organic compounds (VOC).

References

American Thoracic Society/American Lung Association. Health Effects of Air Pollution. New York, NY. 48 pp. 1978.

Ferris, B.G. Health Effects of Exposure to Low Levels of Regulated Air Pollutants: A Critical Review. J. Air Pollution Control Association 28: 482-497. 1978.

Holland, W.W.; Bennett, A.E.; Cameron, I.R.; Florey, C. DeV.; Leeder, S.R.; Shilling, R.S.F.; Swan, A.V.; and Waller, R.E. Health Effects of Particulate Pollution: Reappraising the Evidence. (Special Issue on Particulate Air Pollution). American Journal of Epidemiology 110:525-659. 1979.

U.S. Congress. Report on the Clean Air Act Amendments of 1970, Sr 91-1196, Senate Committee on Public Works. Washington, DC. 1970.

10.3 CURRENT HEALTH STATUS OF SOUTH BOSTON

One element in evaluating potential effects on public health of the New Boston Station coal conversion and various alternatives is the assessment of the current health status of the South Boston community. The health status represents the integration of all factors which affect health. If ambient air quality has had some effect on public health, this effect should be reflected in the statistics which characterize the health status.

The effects, if any, due to ambient air quality are also influenced by many other factors (i.e., smoking, diet, health care, etc) which affect health. It is therefore important to focus on statistics which are most likely to indicate air pollution related effects, if they occur. Consequently, the following discussion focuses on sources of mortality that are believed to be influenced by environmental agents such as air pollution, although other causative factors can still be present.

There are several sources of health-related data for the City of Boston and, in particular, for South Boston. The following discussion utilizes those sources of data that are most appropriate to the health status evaluation of the proposed coal conversion project.

A comprehensive summary of the health status of the City of Boston, including the neighborhood communities like South Boston, was conducted by the city. This report, issued on June 15, 1982, is titled "Health Perspectives: Boston and its Neighborhoods". The demographic data used in the review are the 1980 U.S. census data, the same data presented in Section 4.3 of this report. The vital statistics, births and deaths, were provided by the Massachusetts Department of Public Health, Health Statistics Division.

Information presented in this review has been used to compare health status in the various neighborhoods to determine if South Boston has higher than expected mortality rates for comparable neighborhoods. The mortality data presented in this report are for 1979 and 1980, with rates being developed using 1980 U.S. Census data. Since the neighborhoods have different age distributions and age is a major factor in the risk of death, an age standardized mortality rate has been prepared as a supplement to the review. These age standardized rates are presented in Table 10.3-1.

South Boston ranked third among Boston neighborhoods in overall death rates. The four neighborhoods which had overall death rates comparable to South Boston were Charlestown, the South End, North Dorchester, and Roxbury. It is necessary to investigate the sources of mortality to obtain a clearer indication of the health status. Respiratory cancer, and pneumonia and influenza were selected as having some possibility of environmental influence, and therefore, indicative of the effects of overall air quality. South Boston ranks third after Charlestown and the South End with respect to respiratory cancer. For pneumonia and influenza, South Boston ranks second after the South End and was closely associated by rank with Roxbury and North Dorchester.

Further inspection of Table 10.3-1 demonstrates that the same neighborhoods associated with South Boston for the above described causes of death also rank with South Boston for the nonenvironmentally-related causes of death. If South Boston was at risk due to overall air quality, the rank order among the neighborhoods would be different for environmentally-related sources of mortality than for nonenvironmentally-related sources of mortality. This is not the case, and in fact, the only sources of mortality for which South Boston ranks number one are cirrhosis, suicide, and septicemia (blood poisoning).

Therefore, based on the 1979 to 1980 data, South Boston has not been shown to have a health status different than other communities in the Metropolitan Boston area. These data do not indicate that the present operation of the New Boston power plant has adversely affected the health status of the community.

Information was gathered over a longer period of time to ascertain if the conclusion from the 1979-1980 period was atypical. Figures 10.3-1 and 10.3-2 present the number of deaths due to respiratory cancer, and pneumonia and influenza, respectively. The number of deaths for persons 65 and older has been shown, as well as the total for all ages. These figures clearly demonstrate that the 65 and over age category correlates with the number of deaths for all ages. The correlation coefficient is +0.81 for respiratory cancer and +0.94 for pneumonia and influenza. It can be further seen from these figures that, although there is variability in the number of deaths over the years, there is no trend from 1974 to 1980. A statistical analysis of trend in which the number of deaths are regressed against time revealed for both disease groups and age characterizations that the linear slope is not significantly different than zero ($\alpha \leq 0.05$), i.e., no trend.

Since the population from 1970 to 1980 decreased by approximately 20 percent, it is important to further analyze the time dependent nature of the health status. The age distribution of South Boston was investigated, based on the 1960, 1970, and 1980 census data. The changes in resident population during this period are largely reflective of a decline in ages under 65. The 65 and older population is the most stable age group in the population through this period.

The 65 and older age group is largely responsible for the majority of the deaths described above. Since this age group is relatively stable in number and since the number of people that died did not change from 1974 to 1980, the rate of mortality did not change to any large measure. Therefore, it can be presumed that the 1979 to 1980 data are similar to the 1974 to 1980 data and the health status of South Boston has not changed during the 1974 to 1980 period.

It can be concluded that South Boston has a health status similar to several other Boston neighborhoods with respect to both environmentally-related and nonenvironmentally-related causes of mortality. This pattern of similarity provides no evidence to suggest that the health status of the South Boston community is adversely affected by air quality resulting from pollutants emitted from a variety of sources, including New Boston Station.

TABLE 10.3-1
DEATH RATES BY NEIGHBORHOODS AND CAUSE 1979-1980[1]

	Age-Standardized[2]												
Neighborhood	All Causes	Heart	Ischemic Heart	Neo- plasius	Respir- atory CA	Breast CA	CVA	Pneumonia and Influenza	Nonmotor Vehicle Accidents	Cirrhosis	Homicide	Suicide	Septicemia
Boston-Allston	897.1	364.6	277.2	191.5	53.1	28.8	65.4	43.1	25.0	14.6	6.8	7.2	9.0
Back Bay	871.2	324.9	255.7	192.6	39.9	40.5	53.5	61.4	22.4	17.9	7.9	12.4	7.0
West End	902.1	381.6	272.6	171.0	58.8	15.8	24.3	57.8	33.3	12.6	13.9	-	7.8
North End	833.3	378.4	315.1	180.9	43.2	28.6	24.0	31.9	31.2	-	15.8	7.2	7.9
Charlestown	1,348.8	565.8	454.6	297.7	105.2	27.4	93.1	43.1	38.9	30.7	23.0	7.3	8.1
East Boston	945.3	372.0	283.4	217.6	39.3	45.2	25.9	36.3	32.4	18.3	13.6	9.5	7.7
South Boston	1,261.2	461.1	380.3	251.3	72.7	38.8	66.6	84.6	29.1	34.6	12.3	19.6	36.6
South End	1,309.2	454.3	345.0	258.1	76.7	36.4	83.2	99.2	41.6	30.0	20.5	16.2	35.3
Roxbury	1,191.9	382.2	283.8	252.0	45.6	46.2	67.1	75.3	42.1	16.7	36.1	9.7	18.9
North Dorchester	1,202.6	389.7	305.8	245.1	55.0	36.4	67.9	70.0	42.0	23.7	25.1	14.5	18.2
South Dorchester	1,061.3	361.5	289.8	241.9	58.6	30.6	63.9	60.0	32.6	12.7	18.4	5.2	14.8
Roslindale	1,053.4	462.2	331.0	207.6	41.2	40.1	71.1	61.3	18.1	15.3	6.6	10.5	9.0
Jamaica Plain	1,048.7	432.5	343.2	203.6	49.0	32.9	71.4	64.0	23.5	22.0	5.7	7.1	7.1
West Roxbury	858.0	340.5	294.2	185.6	39.9	33.9	59.8	42.1	12.1	6.5	5.8	3.6	11.9
Hyde Park	1,025.2	383.4	338.6	251.1	67.6	44.6	59.1	53.2	31.3	17.5	6.8	12.6	11.4

1. Based on aggregated 1979 and 1980 death data and 1980 Census population.
2. Standard population is entire City of Boston. Death per 100,000 population.

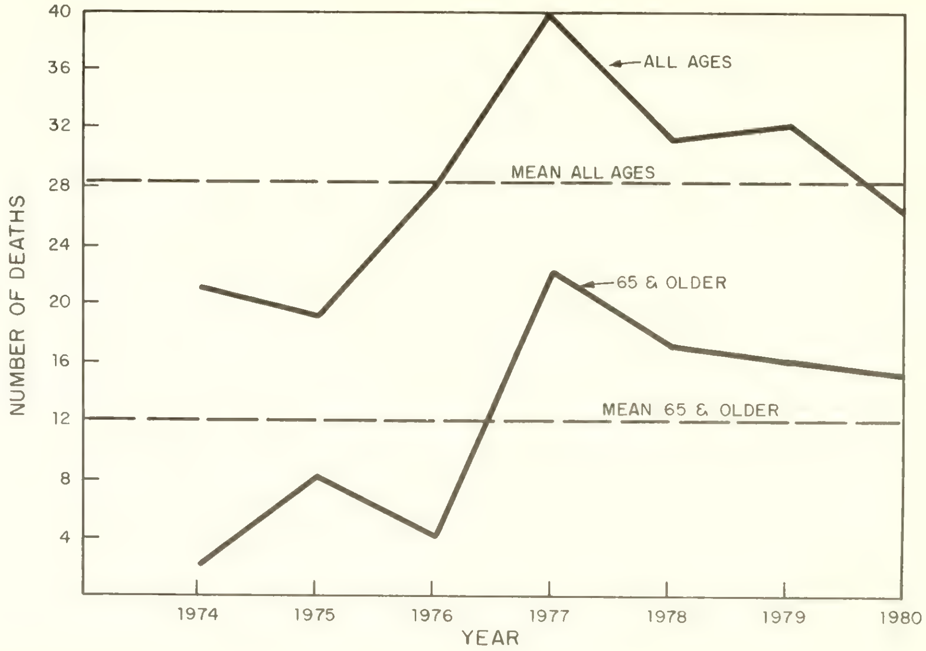


FIGURE 10.3-1
RESPIRATORY CANCER
SOUTH BOSTON (1974-1980)
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

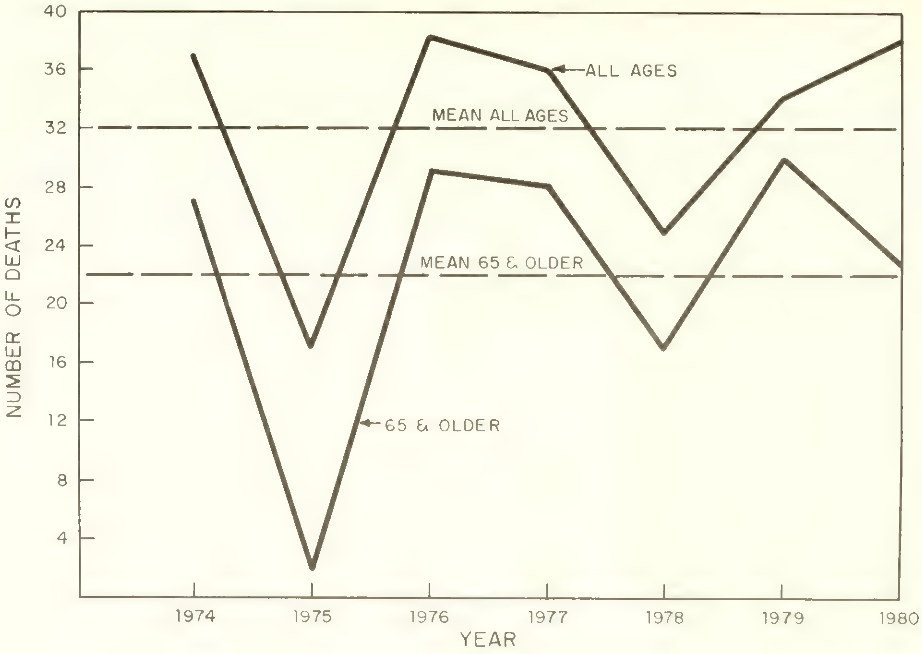


FIGURE 10.3 -2
PNEUMONIA AND INFLUENZA -
SOUTH BOSTON (1974-1980)
NEW BOSTON STATION - UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

10.4 HEALTH IMPACTS OF PROPOSED ACTION

There is a considerable body of scientific knowledge concerning the human health effects of the criteria pollutants. The criteria documents and other independent reviews have discussed the research on effects of these pollutants and the basis and adequacy of the primary National Ambient Air Quality Standards (NAAQS). On the other hand, the scientific literature on noncriteria pollutants is much less organized and complete, and standards and regulations from which to evaluate ambient concentrations do not exist.

The following subsections will briefly summarize the combined ambient impacts on air quality due to the proposed coal conversions of the New Boston Station Units 1 and 2, and Mystic Station Units 4, 5, and 6. Detailed descriptions of existing background air quality in the Boston airshed and the combined impacts due to the proposed coal conversions are presented in Sections 5.3 and 7.1, respectively.

The health effects of criteria pollutants are discussed in less detail in these summaries since the modeled contribution to ground level ambient pollutant concentrations by New Boston and Mystic Stations is within allowable Prevention of Significant Deterioration (PSD) increments and the impacts of the combined coal conversion project will neither cause nor significantly contribute to any violation of national or state ambient air quality standards.

Several reviews and literature references were used to prepare these summaries. They are referenced, where appropriate, in the text. "The Northeast Regional Environmental Impact Study: Reference Document for the Health Effects of Air Pollution" (DOE 1981) is the primary source and is quoted extensively.

10.4.1 Criteria Pollutants

10.4.1.1 Sulfur Oxides/Total Suspended Particulate

These two criteria pollutants, sulfur dioxide (SO_2) and total suspended particulates (TSP), are usually discussed together because they tend to originate together and are major components of the air pollution generated by all fossil-fueled sources. Sulfur oxides contribute to the particulates in that they can exist as sulfate particulates (SO_4). At present, there are no ambient air quality standards for SO_2 transformation products such as sulfuric acid and sulfates, or for the respirable fraction of the TSP. However, the present standards for SO_2 and TSP were promulgated based on criteria developed from studies that measured the effects of these pollutants. It has been concluded that there is a negligible health impact and no detectable effect at levels below the present standards (Ferris 1978).

The predicted emissions from the converted New Boston and Mystic Units together with the emissions from the other 21 major fossil-fueled sources in the region will result in predicted highest and second-highest 24-hour SO_2 concentrations well within the 365 ug/m^3 primary NAAQS. In the PSD study area, the predicted concentrations in the Town of Milton and the elevated areas of Great Blue Hill and Hancock Hill were highest, depending on the meteorology used. Outside the PSD area, the highest ambient ground level concentrations are predicted for Beverly, Manchester, and the Salem/Peabody area. All of these predicted values are well within primary NAAQS. The community of South Boston will experience a general improvement from present ambient concentrations. The annual TSP concentrations will be slightly improved at all receptor locations (within and outside the PSD area) after the proposed coal conversions. The maximum 24-hour TSP concentration increase is predicted to be in Milton (by less than 1 ug/m^3) but the area will remain well within the primary NAAQS.

10.4.1.2 Nitrogen Oxides and Photochemical Oxidants

Substances in the ambient air that possess oxidizing properties greater than that of oxygen are termed "oxidants". In addition, because they are formed in the atmosphere from precursor pollutants (hydrocarbons and nitrogen oxides) with energy provided by solar radiation, these substances are termed "photochemical" oxidants. Ozone is the largest component of the photochemical oxidant complex present in polluted atmosphere, and is used as an indicator of the amount of total oxidant present. Since 1979, photochemical oxidants have been regulated by specifying ozone. The annual primary standard for ozone is 235 ug/m^3. Other active compounds such as peroxyacetyl nitrate (PAN), acrolein, peroxybenzoyl nitrates (PB_2N), and aldehydes usually are present in an oxidant mix, but are not measured. It is estimated that the greatest contribution of these substances to the atmosphere is due to mobile sources (automobile and truck) and that electric utilities contribute approximately 30 percent of the total emitted to the air. This is discussed in detail in Section 5.3.1.1.

Nitrogen oxides also are important components of this complex (Ferris 1978). During the period between 1978 and 1981, no monitor within the Boston airshed has recorded levels above the annual primary NAAQS of 100 ug/m^3 for nitrogen dioxide (NO_2). Since no discernable trend is apparent, compliance with this standard is likely to continue. After the coal conversion at New Boston and Mystic Stations, the predicted annual average NO_2 concentrations will decrease at every receptor point by at least 0.005 ug/m^3. In South Boston, the predicted concentrations will decease considerably more, due to a higher stack which will result in better plume dispersion.

In addition to the annual primary NAAQS, Massachusetts Department of Environmental Quality Engineering (DEQE) has a short-term (1 hour) NO_2 guideline. During preconstruction review hearings for Medical Area Total Energy Plant (MATEP), it was decided that a maximum short-term (1 hour) NO_2 concentration was also necessary to protect public health. The lowest observed effect level for short-term NO_2 exposure, combined with a safety factor of 3, results in a maximum 1-hour ambient NO_2 concentration of 320 ug/m^3, which assures the protection of public health . (Final decision for approval to construct, MATEP - Nov 30, 1979.)

The special 1-hour Massachusetts guideline to protect against short-term acute effects will also not be exceeded. In areas where the power plant contributions to overall background levels are "significant" (DEQE's definition of an increase of 32 ug/m^3), the concentrations are predicted to be well below the 320 ug/m^3 guideline. Concentrations in the community of South Boston are predicted to either decrease or remain approximately the same on both an annual and a short-term basis.

Although detailed formation processes are not well known, there is evidence that a wide variety of precursors including NOx, aldehydes, and volatile organic hydrocarbons (VOCs) contribute to ozone in the atmosphere. As explained in Section 5.3, local emissions of these precursor pollutants are not thought to contribute to local ozone concentrations but instead to be transported over considerable distances while undergoing photochemical oxidation. The Boston region is designated by EPA as a non-attainment area for ozone, as is most of the Eastern United States. The 1-hour average for ozone in Boston is 329 ug/m^3. Bates and Hazucha (1973) observed a reduction in lung function among healthy subjects at an ozone level of 725 ug/m^3, and an enhancement of this effect in the presence of SO_2 at 969 ug/m^3. These concentrations are significantly higher than any predicted after coal conversion.

Because of the predominant mobile source contribution and uncertainity of the dynamics of ozone formation from precursors, the effect the coal conversions will have on ambient ozone levels in the Boston area cannot be predicted. Emissions of some possible precursors will increase at both Mystic and New Boston (NOx and formaldehydes) while others (VOCs) will decrease. To what degree these offset one another in so far as they may affect ambient ozone levels is not possible to discern. Automobile emissions will continue to have a greater effect on the ozone in the environment than the Mystic and New Boston coal converted power plants.

10.4.1.3 Carbon Monoxide (CO)

Automobile emissions constitute the largest source of carbon monoxide (CO) while the contribution to CO concentrations from coal- or oil-fired sources usually is small (National Academy of Sciences 1977). Combustion of fossil fuels in mobile and stationary sources can create a localized and temporary problem within heavily populated areas such as cities (EPA 1979). The current primary NAAQS standard for CO is 10 ug/m³ maximum for 8-hour average exposure, or 40 ug/m³ maximum for 1-hour average exposure (National Academy of Sciences 1977b).

After the proposed coal conversions at the Mystic and New Boston Stations, there will be 21 and 34 percent decreases, respectively, in CO emissions from the stations. The predicted decrease in ambient ground level concentrations will be much smaller at receptor locations due to the small contributions from the stations to overall ambient levels. Although the Boston area does not currently meet the NAAQS for CO and is designated a non-attainment area by EPA, the proposed coal conversions will result in lower ambient concentrations.

10.4.1.4 Lead

Lead is a trace metal emitted along with other trace substances during coal combustion. Lead is the only one to date that has been selected as a criteria pollutant by the EPA. Motor vehicle emissions constitute the major source of lead emissions to the atmosphere, accounting for 88 percent of total lead emissions. Coal combustion is, therefore, not a significant factor in atmospheric lead emissions in the United States, accounting for only 0.2 percent of the total.

After the proposed coal conversions, it is predicted that there will be a decrease in ambient lead concentrations by 0.0001 ug/m³ (quarterly average), and the combined maximum 24-hour impact would be an increase in ambient concentration of 0.0018 ug/m³. This represents about 0.1 percent of the primary NAAQS for lead, which is 1.5 ug/m³ (quarterly average).

10.4.2 Noncriteria Pollutants

10.4.2.1 Respirable Particulate Matter (RPM)

Particulates derived from fossil-fuel combustion may be crystalline or amorphous forms, fibers, spheres, or aggregate meshes (Holland et al 1979). The respirable fraction (RPM) of the particulates emitted from the New Boston and Mystic Stations after conversion is predicted to be similar to the existing oil-fired stations.

Trace elements, organic molecules, and transformation products resulting from coal combustion, have been found to be associated with small-particle emissions. It is thought that these elements and/or their compounds volatilize during combustion and condense or adsorb onto fine particles that are not fully captured by the precipitators (Natusch et al 1974). Some compounds found concentrated on the surfaces of fine particles can have health effects and, as stated by DOE (1981), these compounds are not considered to constitute a regional hazard at concentrations found in the atmosphere.

Another important component of the RPM are sulfur compounds. Approximately 50 percent of the total sulfur emitted during fossil-fuel combustion is associated with the smallest size fraction. Most of this sulfur is thought to be in the form of sulfuric acid mists or metallic sulfate compounds. Other RPM associated contaminants include NO_2 and nitrate and hydrocarbon aerosols.

Particulates are emitted from oil combustion and particle-size distributions are thought to be similar to coal combustion releases (Natusch 1978). While the total quantity of particulate created from oil combustion is less than that created during coal combustion, the net emission after the New Boston coal conversion will be similar to the present oil-fired station. This is due to the electrostatic precipitator which will be installed during the conversion. The total net emissions of RPM after coal firing at the New Boston and Mystic Stations will be approximately the same as the present oil-fired situations.

After the proposed coal conversions of the New Boston and Mystic units, a small decrease in the annual average ambient concentrations of particulates is predicted at all receptors. There is a small predicted increase in the 24-hour concentration at the point of maximum impact. Most other receptors are predicted to show decrease (an improvement). However, both of these changes will be negligible (<1 ug/m^3), so the ambient concentrations of the RPM fraction of the TSP will remain the same.

10.4.2.2 Trace Elements

The amounts of trace elements emitted from coal-fired facilities are variable, based on the type of coal used and the engineering of the facility. The amounts and relative percentages of the trace elements incorporated in coal depend on the geology of the coal-forming basin (Zubovic 1975). Although this variability is recognized, average values of coal can be used to estimated the impacts of these elements on ambient air quality. This has been done in Section 7.1. Trace element emission from the Mystic and New Boston Stations after coal conversion will be small in comparison to ambient background concentrations in the Boston area.

During combustion, trace elements tend to concentrate in, to varying degrees, three fractions that ultimately affect their emission: Group I--those that are not volatilized, but melt and become bottom ash and slag or are emitted from the stack as fly ash; Group II--those that are volatilized but condense out on the fly ash particles as the flue gas cools; and Group III--those that are volatilized and remain almost completely in the gas phase (Klein et al 1975).

Table 7.1-16 is a summary of ambient impacts of trace elements due to the proposed coal conversions. Table 10.4-1 presents this information in a different way. Fluorine and mercury, as well as chlorine, which is not quantified, are released as gases; all others are associated with particulate matter.

The ambient concentration of these elements is calculated assuming both the Mystic and New Boston Stations are converted to coal as proposed, and the existing oil-fired emissions at those units are eliminated. The net change is added to either the measured existing background concentrations of these elements in Boston or to average urban concentrations reported in the literature. Inspection of these tables reveals that most (12 of 20) element concentrations will decrease.

Trace elements in outoor air are associated primarily with particulate matter (Friedlander 1973). Natusch (1978) found that certain trace elements were preferentially absorbed on the smaller particles. DOE (1981), in its analysis of northeast region coal conversions, concluded that when pollutants for which NAAQS standards have been established are in compliance, trace elements were not a public health concern. The proposed coal conversion of New Boston and Mystic Stations will not cause any violation of primary NAAQS.

10.4.2.3 Polycyclic Organic Matter (POM)

Polycyclic organic matter (POM) may be formed during the combustion of fossil fuels or other materials containing carbon and hydrogen. The two classes of POM compounds found most often in ambient air are polycyclic aromatic hydrocarbons (PAHs) and their neutral nitrogen analogues (Santodonato et al 1979). These two chemical groups have been shown to contain a number of agents of public health concern. As a consequence, the PAHs, and benzo(a)pyrene (BaP), have been extensively studied POM compounds. Effects due to the compounds are observed in clinical and occupational setting at concentrations much higher (2 to 4 orders of magnitude) than exist now or after the conversion of New Boston and Mystic Stations to coal (National Research Council 1972).

An important factor that determines POM formation is the efficiency (or completeness) of combustion. The concentrations of BaP associated with coal combustion can vary by a factor of 10,000, depending on the efficiency of the system in question; the BaP emission factor for efficient, modern utility plants is 20-400 ug/MBtu, while the corresponding figure for hand-stoked residential coal furnaces is between 1,700,000 to 3,300,000 ug/MBtu (National Research Council 1972).

In converting the New Boston Station units, several system changes and modifications have been designed to maintain a proper air-fuel ratio and temperature in the combustion zone of the boilers. This will raise the efficiency of combustion for these units. However, the conversion to coal will result in a minor increase in emission rate (per unit time) of POM, and BaP emissions will only increase by 0.0001 lb/hr. The resulting predicted increase in ambient concentrations from these increased emissions will be very small in comparison to ambient background due to other sources.

Urban BaP concentrations in the United States were about 0.5 ng/m^3 in 1975 (Santodonato et al 1979). There are no data on ambient concentrations of BaP or POM for the Boston area. If 0.5 ng/m^3, the typical urban annual average background concentration for BaP, is assumed for Boston, the predicted highest annual concentration due to coal firing of New Boston, 0.00008 ng/m^3, is very small. Similarly, the highest annual concentration of POM due to New Boston coal firing is 0.0028 ng/m^3. Ambient background concentrations of total POM in the United States are not available, but a recent (1975-1976) monitoring study in Norway measured 30 ng/m^3. This value reflected long distance transport from the industrialized areas of England, Scotland, and France (Santodonato et al 1979). Therefore, the levels of POM associated with coal conversion will not represent a public health problem.

10.4.2.4 Radionuclides

Coal contains very small quantities uranium-238, uranium-235, and thorium-232 and their radioactive decay products. The content of these materials in coal samples varies both between and within coal-producing regions. The New Boston Station will use an eastern bituminous coal, which is average in terms of its uranium and thorium contents. Emission rates and annual emissions of representative radionuclides are included in Section 7.1.

When coal is burned, some of the natural radioactivity is volatilized and released into the atmosphere. The trace radionuclides which are not volatilized remain with the ash as do other nonvolatilized trace substances. Both ash and coal have radiological emanation rates less than typical soils and as such have no adverse impacts to public health (see Section 7.1.2.1).

An impact assessment of similar small releases was performed by McBride et al (1978) and summarized by DOE (1981). DOE concluded, that the potential radiation dose from this type of plant "is far below those incurred from naturally occurring background radiation and thus is not expected to result in any increased risk to public health."

In an EPA report entitled, "Radiological Impact Caused by Emissions of Radionuclides into Air in the United States," the impact of a generic coal-fired power plant in a rural setting has been estimated. The New Boston Station radiological emissions were compared to those of the generic facility. Based on a very conservative comparison using the dose to soft tissue, an estimated maximum individual whole body dose of less than 1.0 mrem/yr could be attributed to the New Boston Station. In contrast, the annual whole body dose from natural background external radiation in the United States ranges from 80 to 180 mrem/yr. Thus, the maximum predicted impact of radionuclide emissions from the New Boston Station will be insignificant in comparison to background exposure.

10.4.3 References

Bates, D.V. and Hazucha, M. The Short-term Effects of Ozone on the Human Lung. Proceedings of the Conference on Health Effects of Air Pollutants, NAS-NRC, October 3-5, 1973. Senate Committee on Public Works, Print No. 93-15, U.S. Government Printing Office, 1973. pp 507-540. 1973.

Ferris, B.G. Health Effects of Exposure to Low Levels of Regulated Air Pollutants: A Critical Review. J. Air Pollution Control Association 28:482-497. 1978.

Friedlander, S.K. Chemical Element Balances and Identification of Air Pollution Sources. Environmental Science Technology 7:235. 1973.

Holland, W.W.; Bennett, A.E.; Cameron, I.R.; Florey, C. DeV.; Leeder, S.R.; Schilling, R.S.F.; Swan, A.V.; and Waller, R.E. Health Effects of Particulate Pollution: Reappraising the Evidence. (Special Issue on Particulate Air Pollution) American Journal Epidemiology 110(5):525-559. 1979.

Klein, D.H.; Andren, A.W.; Carter, J.C.; Emery, J.F.; Feldman, C.; Fulkerson, W.; Lyon, W.S.; Ogle, J.C.; Talm, Y.; Vantlook, R.I.; and Bolton, N. Pathways, of Thirty-Seven Trace Elements through a Coal-Fired Power Plant. Environmental Science Technology 9:973-979. 1975.

McBride, J.P.; Moore, R.E.; Witherspoon, J.P.; and Blanco, R.E. Radiological Impact of Airborne Effluents of Coal and Nuclear Plants. Science 202:1045-1050. 1978.

National Academy of Sciences. Carbon Monoxide. Washington, D.C. 1977.

National Research Council. Particulate Polycyclic Organic Matter. Committee on Biological Effects of Atmospheric Pollutants. National Academy of Sciences, Washington, DC. 316 pp. 1972.

Natusch, D.F.S.; Wallace, J.R.; and Evans, C.A., Jr. Toxic Trace Contaminants: Preferential Concentration in Respirable Particles. Science 183:202-240. 1974.

Natusch, D.F.S. Potentially Carcinogenic Species Released to the Atmosphere by Fossil-Fueled Power Plants. Environmental Health Perspect. 22:79-90. 1978.

Santodonato, J.P.; Howard, P.; Baso, D.; Lande, S.; Selkirk, J.K.; and Sheehe, P. Health Assessment Document for Polycyclic Organic Matter. EPA-600/9-79-008. Prepared by Syracuse Research Corporation for the USEPA. Research Triangle Park, N.C. 1979.

U.S Department of Energy (DOE), The Northeast Regional Impact Study: Reference Document for the Health Effects of Air Pollution. ANL/ES-R1. 1981.

U.S. Environmental Protection Agency. Air Quality Criteria for Carbon Monoxide. EPA-600/8-79-022. 1979.

Zubovic, P. Geochemistry of Trace Elements in Coal. U.S. Geological Survey, Reston, VA. 1975.

TABLE 10.4-1

COMPARISION OF TRACE ELEMENT CONCENTRATIONS IN ng/m^3

Trace Element	Annual Background Concentrations$^{(1)}$	Predicted Annual Ambient Concentrations$^{(2)}$
Aluminum	NA	>22
Antimony	NA	(0.05)
Arsenic	0.4	0.33
Barium	18	18.3
Beryllium	0.3	0.29
Cadmium	2.0	1.90
Chromium	15	5.1
Cobalt	0.9	<0.85
Copper	219	214.6
Fluorine	NA	(>1.2)
Iron	1100	1125.3
Magnesium	NA	(0.10)
Manganese	28	27.95
Mercury	NA	(<0.05)
Molybdenium	NA	(0.05)
Nickel	19	18.70
Selenium	0.8	0.90
Sodium	NA	(1.3)
Vanadium	79	76.7
Zinc	300	329.95

NOTES:

1. Annual background concentrations are either monitored values from the Boston area or reported values in literature. See Table 7.1-16. NA - Ambient background information not available.

2. Ambient concentration after coal conversions at New Boston and Mystic Stations calculated from data provided in Table 7.1-16. Values marked > (greater than) are the increase in background concentration. Values in parentheses are the reduction in existing background.

10.5 COMPARATIVE HEALTH IMPACTS OF ALTERNATIVES

The applicant proposes to convert New Boston Station Units 1 and 2 from oil burning to 1.5 percent sulfur coal, based on a 30-day average. Included in this proposal is the installation of electrostatic precipitators and a new 369-foot chimney. As explained in Section 7.1, this proposal will result in small increases in predicted ambient concentrations of some pollutants at certain receptor locations. Other pollutants will decrease in ambient concentrations. However, other options in terms of fuels, equipment, and strategies exist. Each of these alternatives would result in a different net impact on air quality and, therefore, is associated with a different potential for public health impacts.

This section compares the alternatives requested by the Massachusetts Environmental Policy Act (MEPA) unit of the Executive Office of Environmental Affairs (EOEA) in the final scope for the Draft Environmental Impact Report (DEIR) for New Boston Station. These alternatives are evaluated only in terms of the relative ambient concentrations of important pollutants that each alternative would produce relative to the preferred coal conversion alternative or "base case". The applicability or availability of the technologies or fuel, as well as the economic, environmental, and regulatory considerations, are not considered here. They are addressed in more detail in Section 9. Technological options considered here assume the base case fuel and stack configuration.

In terms of pollutant emissions and resulting ambient air quality concentrations, it is clear that burning natural gas if it were available, which it is not, is a desirable alternative. The distribution strategies such as purchasing additional electricity or phasing out the New Boston Station would result in New Boston Station operating at a progressive lower capacity. This would lead to reduced emissions and lower ambient concentrations in the area influenced by New Boston emissions. Construction of a facility in the suburbs would change the area of impact and probably lower the ambient concentrations in the New Boston Station impact area.

Burning 2.2 percent sulfur oil is equivalent to the base case in terms of sulfur concentrations, but oil combustion would result in lower ambient concentrations in other pollutants such as certain trace elements and polycyclic organic matter. The technology options - soot blowing controls, scrubbers (wet or dry), fluidized bed combustion and limestone injection - would result in pollutant emissions and resulting ambient air concentrations similar to the proposed "base case". Section 9.5 provides a discussion of these pollution control methods.

The coal options would result in different emissions. The use of lower sulfur coal would result in lower ambient sulfur dioxide (SO_2) concentrations. The use of lower ash coal would probably result in particulate emissions similar to the base case which includes electrostatic precipitators.

The alternative of no change in the present station would maintain the present ambient SO_2 concentrations. Several of the other pollutants, such as trace elements and POM, are emitted in lower quantities with oil combustion and would, therefore, be in lower ambient concentrations than the base case. Even though these differences in emissions exist, it is unlikely that the differences in ambient concentrations would be significant. Coal/water mixtures are less efficient because of heat loss required to evaporate the water. Greater amounts of coal are usually burned and result in higher emissions and ambient concentrations in comparison to the base case.

This evaluation of the alternatives is based solely on their effects on ambient air quality concentrations of some important pollutants. The comparison assumes that all alternatives are technically and economically feasible. Since this is not the case, the results of these comparisons should be assessed in conjunction with the analysis of alternatives presented in Section 9.

Although there are differences in pollutant emissions from the various alternatives considered here, many concentrations emitted from a facility utilizing the different options would not produce significant changes in ambient concentrations. Where ambient concentration differences may be measureable, the significance in terms of public health impacts may not be detectable. All of the alternatives considered are expected to result in ambient air quality impacts that are within the primary (health based) National Ambient Air Quality Standards (NAAQS).

10.6 CONCLUSIONS

The combined contribution to ground level pollutant concentrations by the New Boston and Mystic Stations will neither cause nor exacerbate any violation of national or state ambient air quality standards after the proposed coal conversions. Noncriteria pollutants emitted by the converted stations will cause increases in concentrations that are small in comparison to either Boston or typical urban ambient concentrations. Many pollutants will show a net improvement in ground level ambient concentrations as a result of the proposed conversions to coal. Different chemical compositions between oil and coal, and increased stack heights after conversion, will result in different air quality impacts at different receptor locations. This section shows that these minor changes in air quality will not cause significant health effects or changes in general health status of the population residing in the area of impact. Therefore, from a public health perspective there is no difference among the alternatives considered in this analysis.

SECTION 11

PROPOSED MEASURES TO MINIMIZE ENVIRONMENTAL IMPACTS

11.1 CONSTRUCTION PERIOD MITIGATION MEASURES

Construction activities for the New Boston Station coal conversion will take place from about January 1985 through June 1988. The various measures which will be used to minimize environmental impacts during the construction period are discussed below.

11.1.1 Noise Control

Noise mitigation measures will be taken to ensure any noise impacts during the construction phase comply with the Regulations for the Control of Noise in the City of Boston. Section 4.1 of the City of Boston regulations restricts noise emitted from construction sites, as measured at the nearest residential property line, to 75 dBA (L_{10}) and 86 dBA (Lmax). Section 4.3 of the regulations limits noise levels of all construction devices to a maximum of 86 dBA at 50 feet from the device, with the exception of emergency service. Section 4.4 excludes impact devices, such as pile drivers and pneumatic tools, from the provisions of Sections 4.1 and 4.3.

Potential construction noise impacts will be mitigated by the implementation of several measures. The most effective control will be to limit most of the construction activities to daytime hours since the community is expected to be generally less sensitive to noise intrusion during the daytime due to the higher ambient noise levels and the general participation in activities less sensitive to noise than sleeping.

Most noisy construction activity, including, but not limited to, all demolition activity, pile driving, concrete placement, material handling in the Boston Edison Company (BECO)-owned K Street property and waste removal will, whenever possible, be scheduled for daytime hours only. In addition, all motorized equipment will be equipped with mufflers, and station service air will be utilized in lieu of compressors, whenever possible. Staff change horns will be activated at the lowest practical level and for the shortest time practical. Public address system use will be reduced by providing pagers or walkie-talkies to those workers most frequently paged. Activities associated with the establishment of the reserve coal pile will be limited to daytime hours only. Steamline blowout noise will be controlled with mufflers designed for this application. As a result of implementing these measures, community impact will be minimized to the greatest extent possible, and, as described in

Section 7.2, construction activities will comply with the City of Boston construction noise level criteria.

11.1.2 Traffic and Parking Control

As described in Section 7.4.1, an estimated peak of 520 vehicles is projected during the construction phase of the New Boston Station coal conversion. Part of the BECO-owned K Street property located north of East First Street, between I and K Streets, will serve as the construction parking area. The lot is of adequate size to accommodate all parking requirements associated with the construction phase. Of the total 8.6 acres of K Street BECO property proposed for use during the construction period, approximately 4.5 acres or 52 percent of the lot will be used for construction parking. Therefore, no parking spillover will impact on-street parking in South Boston.

The addition of approximately 520 vehicles during the peak construction period represents a 19.2 percent and 12.3 percent increase in morning and evening rush-hour (7-9 am and 3-6 pm) daily traffic volumes, respectively, at the signal-controlled intersection of East First and Summer/L Streets (Boston Traffic and Parking Department 1980). Section 7.4.1.2 discusses construction period traffic impacts in more detail. The existing levels of service (LOS) for this intersection range from A to B (A - no restrictions on posted operating speed, free-flow; B - some traffic restrictions on posted operating speed, stable flow.) during rush hours. The percentage increase in traffic volume would cause LOS to decline slightly. Limited duration of peak volumes and traffic dispersion to other intersections in the station vicinity mitigate these increases in traffic volume. Due to the limited peak construction period of 8 to 10 months, daily traffic volume increases will be temporary and will require no mitigation measures. However, BECO will monitor traffic conditions during the construction period and will be prepared to implement appropriate mitigation measures during shift change periods.

BECO will encourage construction employees to use either public transportation serving South Boston, and specifically the station vicinity, or to carpool. The Massachusetts Bay Transporation Authority (MBTA) currently operates four bus routes which stop within five blocks of New Boston Station. These routes include: Route No. 7, City Point - South Station via Northern Avenue; Route No. 9, City Point - Copley Square via Broadway Station; Route No. 10, City Point - Dudley Station via Southampton Street; and Route No. 11, City Point - Downtown via Bayview Route. Figure 11.1-1 shows the area of South Boston served by these routes. Buses on these routes operate at 10 to 20 minute intervals on weekdays, with some service reductions on weekends. Table 11.1-1 shows bus capacity ridership during rush hours on Route No. 7, 9, 10, and 11. Review of capacity ridership reveals under-utilization of all routes serving the South Boston area. Therefore, bus capacity exists during the morning and evening commuting hours to accommodate a portion of construction phase employees who would ride public transportation.

Two MBTA Rapid Transit Stations are also located in South Boston and are identified on Figure 11.1-1. They are the Broadway and Andrew Square Stations of the Red Line. Rapid Transit and bus service provide good direct access from the City and Greater Boston to the New Boston Station vicinity.

11.1.3 Fugitive Dust Suppression

As discussed in Section 7.1.1.1, fugitive dust during the construction period can potentially be generated from a number of construction activites. Generally, fugitive dust emission sources include vehicular activity, particularly construction equipment, and wind erosion, especially of loose material on excavated construction areas and stockpiles of construction materials. In addition, establishment of the reserve coal pile is a potential source of fugitive dust emissions.

Control measures to minimize dust emissions which are intended to be implemented during the construction phase of the New Boston Station coal conversion are as follows:

- Cleaning of paved onsite roads on a regular basis. This will generally be performed with a street sweeper equipped with a closed hopper and water spray system to continuously prevent the creation of fugitive dust during the sweeping operation
- Spraying with water or covering with tarpaulins all trucks hauling materials such as sand, gravel, or dirt
- Establishing a watering program in the construction area (particularly during demolition activities) and on stockpiles of construction materials and spoils
- Restricting speeds of vehicles and mobile equipment onsite
- Application of a wetting agent and/or water through a portable spray system during establishment of the reserve coal pile

Application of these mitigation measures will ensure compliance with Massachusetts Air Pollution Control Regulations, 310CMR7.01 (General Regulations), and 310CMR7.09 (Dust, Odor, Construction, and Demolition).

11.1.4 Erosion and Sediment Control

Earthwork will be required for the following activities: construction of the bottom ash handling system, construction of waterfront coal and ash handling facilities, preparation of the lined reserve coal pile site, construction of the active coal storage silos, construction of the coal pile runoff ponds, installation of precipitators, construction of the chimney, installation of bottom ash tanks and fly ash storage silo, extension of the existing roadways, and grading of construction and parking areas. It is also possible that some demolition activities may require earthwork to accommodate the final mechanical arrangement of proposed new equipment. The largest excavation/grading activity is associated with preparation of the 6- to 7-acre area for the reserve coal pile and runoff ponds. Erosion of site soils is not anticipated to be a problem during construction. Earthwork activities generally involve excavation and grading only, and sediment from these activities will be contained within excavation or grading limits.

Only temporary and minimal stockpiling of spoil from earthwork will occur onsite, and spoil not used in grading will be trucked offsite for appropriate disposal during the construction period. Any spoil accumulation will be kept away from the Reserved Channel or surrounded by a ditch to minimize the potential for sediment-laden runoff to enter the channel.

Most surficial soil at the site is fill containing gravelly sand, clay, coal, cinders, and bricks. This fill is not particularly erosive, and requires no special treatment to minimize erosion, as is typical of finer grained soils such as silts. Soil exposure will be minimized to the maximum extent practical through the careful scheduling of construction activities.

Site topography is quite flat, and rainfall generally would be contained within excavation limits. Site soil is relatively pervious, and, barring unusually heavy rainfall during construction, pumping of sediment-laden runoff from excavations should not be required. If necessary to expedite a particular construction activity, accumulated runoff may be pumped to the wastewater treatment system basins to allow settling of suspended matter.

Should erosion be experienced at the site, temporary seeding of exposed areas or other surface treatments may be employed to stabilize the area. A crushed stone or gravel surface may be applied to the construction parking area after grading. Hay bale runoff barriers and runoff diversion ditches may be employed in the unlikely event of erosion.

11.1.5 Construction Wastes Disposal

Solid and liquid wastes generated during construction include chemicals (e.g., asphalt, used equipment lubricating oils, acids for equipment cleanup, soil additives, spent solvents, and concrete curing compounds), concrete mixing drum washings, solid refuse (e.g., equipment packing and boxes, scrap construction materials, and construction crew trash), demolition wastes, excess fill material, and sanitary wastes. The disposal of spoils dredged from the Reserved Channel during construction of the berthing basin to accommodate coal transport vessels is discussed in Section 8.1.3.

The construction effort will be managed to prevent uncontrolled discharge of these materials to the environment. All concrete mixing drum washings will be returned to the concrete supplier's batch plant. Construction chemicals will be disposed offsite in an environmentally acceptable manner by subcontractors performing the construction activities. Solid wastes from construction, including demolition wastes, will be disposed offsite in a licensed landfill. Certain demolition wastes such as bricks and metals may be recycled, if practical, thus reducing disposal quantities. Sanitary wastes from construction personnel will be controlled by the use of portable chemical toilets provided by contractors for the duration of the construction period. These wastes will be handled offsite by a licensed contractor.

During the construction period, asbestos materials currently blanketing ducts or other portions of existing structures will be removed in the process of demolition of some site structures. This action will be performed in accordance with Occupational Safety and Health Administration requirements (29CFR1910.1001), which outline precautions necessary for the protection of workers during asbestos removal operations. In addition, the removal, disposal, and handling of asbestos will be conducted in accordance with the DEQE requirements for friable asbestos wastes (310CMR7.09 (2), 7.09 (5), and 7.15 (2)), and U.S. Environmental Protection Agency (EPA) regulations for emissions of hazardous air pollutants (40CFR61.20). A written notice of intent to demolish a structure containing asbestos will be filed with the DEQE and EPA prior to demolition activities.

11.1.6 References

Boston Traffic and Parking Department. Intersection Turning Movement Count, September 23, 1980. Prepared by Traffic Control Systems of Brighton, Massachusetts. 1980.

TABLE 11.1-1

CAPACITY RIDERSHIP, BUS ROUTES NO. 7, 9, 10, AND 11

	Rush Hour Period			
	Morning: 6:00 am - 9:00 am		Evening: 3:00 pm - 6:00 pm	
	Hourly Average % Seating Capacity	Ridership as % Total Capacity	Hourly Average % Seating Capacity	Ridership as % Total Capacity
Route Number 7				
Inbound [1]	65.9	47.1	42.2	30.2
Outbound [2]	68.9	49.2	91.1	65.1
Route Number 9				
Inbound	112.6	80.4	22.2	15.9
Outbound	16.3	11.6	97.8	69.8
Route Number 10				
Inbound	31.9	22.8	21.4	15.3
Outbound	13.3	9.5	53.3	38.1
Route Number 11				
Inbound	81.5	58.2	20.7	14.8
Outbound	8.9	6.3	88.1	63.0

Seating Capacity = 45 passengers
Total Capacity = 63 passengers

SOURCE:

Massachusetts Bay Transportation Authority correspondence dated February 18, 1983.

NOTES:

1. Inbound refers to service from South Boston to the City of Boston proper.

2. Outbound refers to service from the City of Boston proper to South Boston.

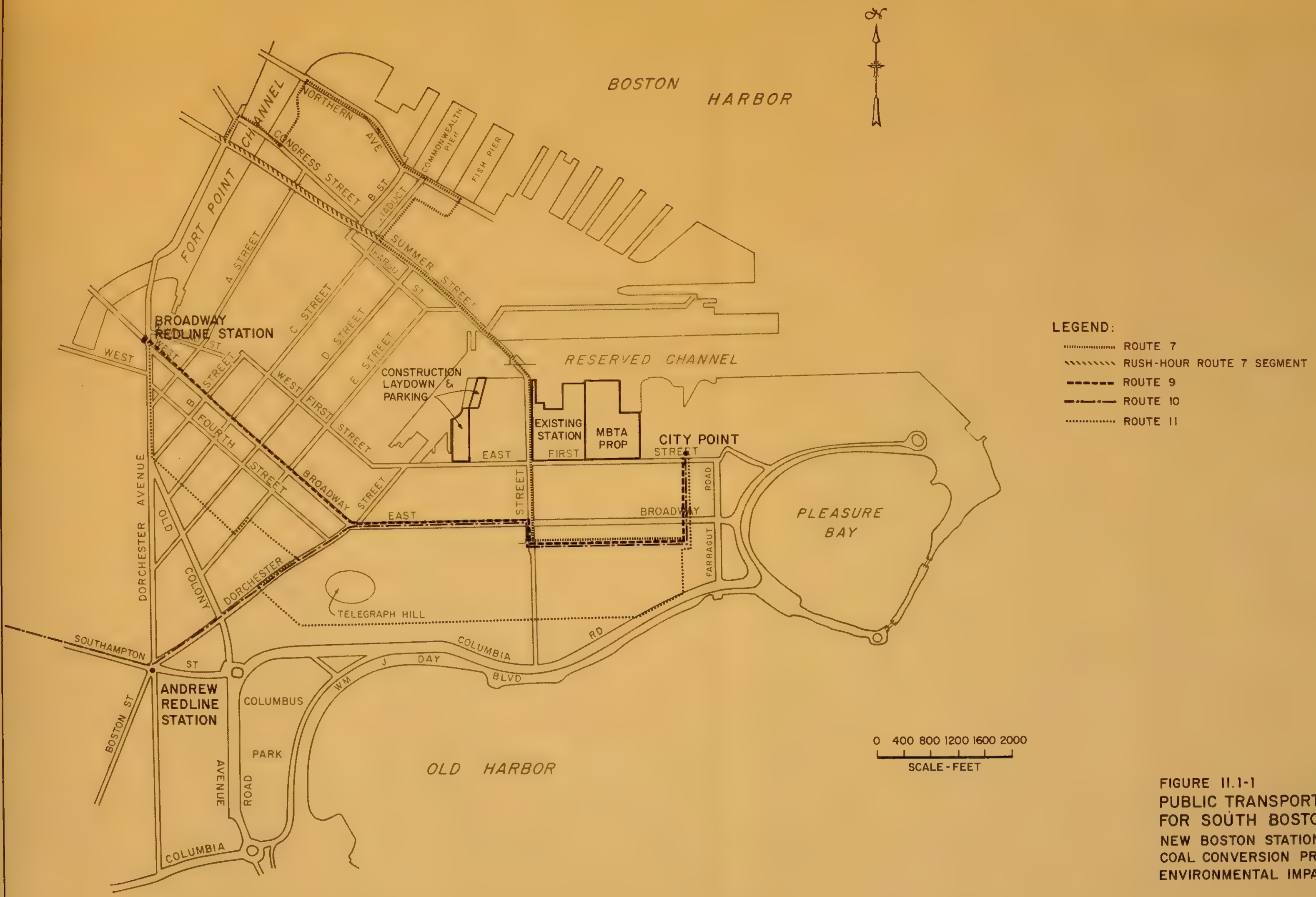


FIGURE 11.1-1
PUBLIC TRANSPORTATION
FOR SOUTH BOSTON
NEW BOSTON STATION -UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

11.2 OPERATIONAL PERIOD MITIGATION MEASURES

11.2.1 Coal Handling and Storage Controls

This section discusses coal spillage control, noise control, fugitive dust suppression, fire prevention, and operation with reduced reserve coal storage. Mitigation measures associated with wastewaters and aesthetics are presented in Sections 11.2.5 and 11.2.6, respectively.

11.2.1.1 Coal Spillage Control

Coal will be delivered to New Boston Station by self-unloading oceangoing vessels. Coal spillage, which can be a problem with batch unloaders such as a clamshell, is inherently minimized by the continuous type of unloading operation proposed. Coal unloading will not start until the single covered conveyor boom from the vessel is secured within the enclosed unloading surge bin located at the waterfront. The conveyor boom will be equipped with belt cleaners and a drip pan to catch any spillage from the belt. Coal transfer from the unloading surge bin to the active storage silos, reserve pile, or station is via conveyors in totally enclosed galleries, thereby eliminating any coal spillage outside the system.

11.2.1.2 Noise Control for Coal Handling Equipment

Noise mitigation measures for coal handling and storage equipment are discussed in this section. Refer to Section 11.2.9 for the control of noise from other equipment associated with the conversion and to Section 7.2.2 for expected noise levels following conversion.

Due to the proximity of New Boston Station to the community, noise controls will be required for virtually all equipment added for the conversion in order to comply with the City of Boston noise code.

Presently, Boston Edision Company (BECO) is conducting a Noise Abatement Program (see Appendix A) to reduce New Boston Station noise levels below the limits specified by the regulations for the City of Boston, shown in Table 11.2-1. Noise mitigation measures will be specified for the conversion so that the station noise level achieved upon completion of the Noise Abatement Program, will not be increased by the operation of the equipment added during conversion.

The design of the coal handling and storage system at New Boston Station includes several noise mitigation strategies. Storage silos, transfer points, surge bins, conveyors, and the crusher will be totally enclosed, thereby attenuating the noise emissions of equipment operating inside these structures. Additionally, the enclosures for the crusher and conveyor transfer houses will be acoustically treated to attenuate intermittent higher noise emissions from vibrators and equipment requiring maintenance.

Coal will be delivered to New Boston Station by oceangoing, self-unloading vessels. During unloading operations, which can be accomplished in approximately 9 hours, the vessel will unload coal via a covered boom conveyor to a stationary dock coal surge bin which will be enclosed to minimize noise emissions. Typical noise sources on a self-unloading coal vessel are the boom conveyor drive motor and gear trains, and the oil cooler pump and motor assemblies, which are generally located on deck. Noise control for the vessel boom conveyor drive motors and the oil cooler motors can be achieved by purchasing quiet motors and/or motor silencers. Noise control for the oil cooler pumps will require acoustical enclosures. The vessel construction will include noise controls so that it can operate at all BECO facilities and comply with the City of Boston noise regulation at New Boston Station.

Reserve coal pile formation will require coaldozers during the construction phase (as discussed in Sections 7.2 and 11.1). During normal station operation, coal will be reclaimed from the active coal storage silos. During emergency conditions, coal will be reclaimed from the reserve coal pile using coaldozers. Coal pile reclaim is expected to occur rarely, if at all, due to the large capacity of the active storage silos. Nonetheless, to mitigate nighttime noise impacts and comply with city and state noise regulations, reserve pile reclaim and stockout operations will be limited to the daytime hours (7 am to 6 pm).

11.2.1.3 Fugitive Dust Suppression

An extensive state-of-the-art fugitive dust control system will be incorporated in the coal handling and storage operations. Summarized below are the primary control measures which will be implemented to minimize fugitive dust generation. A description of the coal handling and storage operations, including a coal-handling flow diagram, is provided in Section 6.2.7. An assessment of the control efficiencies of the individual fugitive dust collection/suppression systems, and the resulting controlled fugitive dust emission rates are presented in Section 7.1.2.1.

The primary control measures which will be implemented to minimize fugitive dust are as follows:

- Self-unloading coal delivery vessel with a covered conveyor (as opposed to dustier clamshell unloading)

- Enclosed unloading surge bin with a dust collection system

- Total enclosure of all conveyors except the covered silo emergency reclaim conveyor and the covered conveyor boom on the self-unloading vessel
- Active coal storage in silos with under-silo reclaim equipped with a dust collection system
- Fully enclosed transfer points equipped with a dust collection system
- Fully enclosed transfer-crusher house equipped with a dust collection system
- Grass-covered reserve coal pile having a straw mulch base with an asphalt emulsion binder
- Reserve pile stockout by radial stacker with attached telescoping chute and dust collection system
- Wetting of coal during reserve stockout and reclaim operations

As described in Section 7.1.2.1, the overall fugitive dust suppression system collection efficiency, calculated to be 98.8 percent, reflects the best practical control technology for dust control. Each integral part of the overall system represents state-of-the-art fugitive dust control. As described in Section 7.1.2.1, the quantity of fugitive dust generated by the coal storage and handling operations is expected to have a negligible impact on particulate levels in South Boston. The control system will ensure compliance with Massachusetts Air Pollution Control Regulations for Visible Emissions (310CMR7.06), and Dust, Odor, Construction, and Demolition (310CMR7.09).

11.2.1.4 Fire Protection

The following features will be provided to minimize the potential for fires and to control the spread of fires in the coal handling and storage systems at New Boston Station:

- Water spray fire protection systems and fire detection equipment in all enclosed areas including tunnels, pits, transfer houses, tripper gallery, and along belt conveyors
- Fire hydrants surrounding the reserve coal pile
- Dust suppression and/or collection systems at all transfer points, active silos, and plant bunkers to reduce the accumulation of coal dust in these areas

- Belt conveyor systems which automatically shut down when fire is detected to prevent fire from being carried along the system

- All structures constructed of noncombustible materials and conveyor belts manufactured of fire-resistant materials

- Explosion-proof electrical equipment in enclosed areas

- The reserve coal pile compacted to a density of approximately 70 lb/cu ft to eliminate air pockets in order to prevent spontaneous combustion of the coal

- Continuous venting of enclosed areas of the coal handling system to prevent accumulation of gases

- A fire detection and protection plan for the active coal storage silos and the reserve coal pile

The fire detection plan for the coal storage facilities will consist of regular and periodic inspections by operating personnel of the active coal silos and the reserve coal pile. In the unlikely event of a hot spot developing within the coal silos, coal will be removed from the silo utilizing the rotary plow feeder and silo reclaim conveyor running at high speed (1600 tons per hour). From the silo transfer house, the hot coal will be conveyed via the emergency silo reclaim conveyor, surge bin, waterfront conveyors, and reserve pile stockout conveyor to the reserve pile for cooling. The method of cooling will be to spread out the coal using the coaldozers such that heat is dissipated to the atmosphere faster than it is generated by the oxidation process. The nature of the spontaneous combustion process with coal is such that it is easily detected and can be readily interrupted and terminated at any point in the process, even after ignition. As such, if it occurs at all, it poses mainly a nuisance rather than a hazard to the plant and environs. Measures described above will be undertaken to effectively minimize or prevent the occurrence of spontaneous combustion of stored coal at New Boston Station.

11.2.1.5 Operation with Reduced Reserve Coal Storage

Impacts associated with the storage of coal, particularly fugitive dust, wastewater, and aesthetics, as described in Section 7, will be mitigated at New Boston Station by operation with minimal reserve coal storage capacity. This can be accomplished by retaining the oil-firing capabilities of the New Boston Station units. Maintaining the capability to burn oil relieves the fuel supply reliability problem which could occur during periods of labor strife either at the coal mines, railroad companies or shipping companies.

New Boston Station reserve coal storage will be capable of providing only approximately 50 days of fuel (based on a 70 percent annual average station load). Additionally, approximately 11 days supply of coal will be in the active storage silos. The total is considerably less than typical station coal storage capacity. Coal storage policies of utilities in the United States in 1981 averaged approximately 95 days of coal storage (DOE 1982).

11.2.2 Precombustion Controls

11.2.2.1 Coal Washing

Coal washing, also known as coal cleaning or coal preparation, is a process utilized by many coal suppliers prior to shipment to reduce the ash and pyritic sulfur content of the coal. Ash and sulfur content can usually be reduced to some extent through the application of physical separation techniques.

All coals are different in their constituent makeup because of varying geologic origin. For example, two coal samples, each having a total sulfur (i.e., pyritic and organic) content of 2.0 percent, are likely to have differing pyritic-to-organic fractions and ash content. As such, the application of coal washing techniques may yield different pyritic sulfur and ash removal efficiencies. Only a portion of the pyritic and virtually none of the organic sulfur is removable by washing.

Coal washing may be performed by suppliers to ensure an average coal sulfur content of no more than 1.5 percent and reduce the amount of ash. A method often used in coal cleaning is to first crush and size the coal with rotary breakers, and then remove coarse refuse. The coal is then sent through a jig which cleans the coal by agitating it in water. This process is used to reduce both the ash and pyritic sulfur content of the coal and to make it more uniform in quality. The amount of ash and sulfur removed can only be determined through washability tests since some coals are inherently less responsive to separation of these impurities. However, studies show that this level of coal washing can remove up to 20 to 25 percent of the ash and 15 to 20 percent of the total sulfur (EPRI 1980; EPA 1979; EPA 1980; DOE 1979; REI 1982).

11.2.2.2 Combustion Controls

To allow firing of either coal or oil, new burner and combustion controls will be added as part of the coal conversion. The conversion modifications will also include new dual-register burners and compartmented windboxes to provide for better combustion control, more even temperature distribution, and thereby lowering nitrogen oxides (NOx) production. An additional burner will be added to each burner level to decrease the heat input per burner and more evenly distribute the heat input to the furnace.

Although NOx emission standards do not apply to emissions from New Boston Station, NOx emissions will be reduced to the lowest level practical (estimated to be less than 0.8 lb/MBtu) for these boilers. To control NOx emissions, excess air in the combustion process will be minimized to the extent possible without causing incomplete combustion in the boiler furnace, a situation that would result in increased emissions of other pollutants such as particulate matter (PM) and carbon monoxide (CO). As such, CO emissions will be the lowest achievable consistent with minimizing the NOx emission rate. See Section 7.1.2.1 for expected CO emission rates.

Emissions of volatile organic compounds (VOC) from boilers can only be controlled through boiler design and combustion control. As discussed for CO, VOC emissions will be the lowest achievable consistent with constraints necessary to ensure the lowest possible emissions of NOx. See Section 7.1.2.1 for expected VOC emission rates.

Proper operation and maintenance of the boiler, as recommended by the manufacturer, will be implemented as a means of minimizing emissions of all pollutants.

11.2.3 Postcombustion Controls

11.2.3.1 Electrostatic Precipitators

Electrostatic precipitators will be used to control particulate matter (PM) emissions at New Boston Station to a maximum of 0.08 lb PM/MBtu of heat input, which is less than the current 0.12 lb PM/MBtu emission limitation. In the precipitators, the flue gas leaving the boiler air preheaters is passed through a series of electrostatic fields. PM, consisting of small particles of ash carried along in the gas stream, becomes electrically charged when subjected to the electrostatic field. Once charged, the particles are attracted to the oppositely-charged collection electrodes, where they are captured from the gas stream. The collected ash drops into hoppers beneath the precipitators and is pneumatically conveyed to the ash storage silo for transport to offsite storage or disposal.

A redundant electrical field is provided in the precipitator to increase the precipitator's availability. Each precipitator electrical field is monitored in the main control room with an annunciator which alerts the operator if an electrical field fails. Gas leaving the precipitators is continuously monitored for opacity (visibility), ensuring the precipitators are operating properly. The opacity level is recorded by strip charts within the control room, and an annunciator is alarmed if the opacity exceeds 20 percent. A standard precipitator maintenance procedure is followed to maintain the precipitators in their optimum operating condition. These processes will ensure compliance with Massachusetts Visible Emission Regulations 310CMR7.06(1).

Evaluation of historic availability data from the North American Electric Reliability Council (NERC) for precipitator equipment of the approximate size proposed for New Boston Station shows that the total equivalent availability factor of the precipitators is 99.916 percent. The equivalent availability factor includes the effects of forced outages and forced partial outages. A forced partial outage is defined as the occurrence of a component failure or other condition which requires that the load on the unit be reduced 2 percent or more immediately, or up to and including the next weekend. Maintenance and planned outages are not included in the availability calculations.

It should be emphasized that a component failure in the precipitator equipment does not mean that the particulate emission limitation will be exceeded. Plant operation will be adjusted, if necessary, to ensure that the particulate emission limitation is not exceeded.

Utilization of precipitators at New Boston Station represents state-of-the-art particulate emissions control. Due to their highly efficient control potential and record of reliability in the utility field, precipitators will continually ensure compliance with applicable PM and visible emission requirements, thereby minimizing any adverse environmental impact.

11.2.3.2 Chimney

As described in Section 6.2.2, flue gases from the operation of the boilers will be exhausted through a dual-flue reinforced concrete chimney whose exit elevation is 369 feet above grade (380 feet above mean sea level). Chimney (or stack) height can be established in accordance with Good Engineering Practice (GEP) guidelines (see Section 3.2). Establishment of chimney height according to GEP requirements ensures that emissions do not result in excessive concentrations of any pollutant in the immediate vicinity of the station as a result of atmospheric downwash, eddies, and wakes. However, in situations where conflicting concerns arise (e.g., potential interference with air traffic), GEP requirements can be preempted and a shorter (or taller) chimney height substituted.

Chimney height at New Boston Station is constrained due to the station's proximity to Logan International Airport. The Federal Aviation Administration's (FAA) height restriction for any structure in the New Boston Station vicinity is no greater than 369 feet above grade (see Section 3.1). Theoretically, to avoid all potential building downwash effects, a chimney height of 422.5 feet is necessary. Although the 369-foot chimney is 53.5 feet below the calculated GEP height, it is 119 feet taller than the existing 250-foot stacks at New Boston Station, and will improve dispersion. The specific meteorological conditions necessary to cause plume downwash are a rare and worst-case event (see Appendix C). It is estimated that a 40 mile per hour wind would be necessary at New Boston Station to bend the plume sufficiently to cause downwash with the proposed 369-foot chimney. Thus, the new 369-foot chimney height will help minimize air quality impacts while simultaneously complying with FAA restrictions.

11.2.4 Onsite Ash Handling and Storage Controls

11.2.4.1 Fly Ash System Controls

A pneumatic fly ash removal system will be provided at New Boston Station to remove fly ash from the precipitator hoppers and convey it to the fly ash storage silo. The transport air used by this system will be vented to the atmosphere at the fly ash silo through a fabric filter to remove entrained fly ash. Utilization of a fabric filter silo vent represents state-of-the-art fugitive particulate emissions control in fly ash handling systems. It offers a control efficiency greater than 99 percent. A dustless unloader will be provided under the fly ash storage silo to condition the fly ash with water to control dust emissions during unloading of the ash for transport by truck or barge to offsite storage/disposal. Covered conveyors will be provided to convey the conditioned ash to a barge for transport to offsite storage/disposal. A truck spout will also be provided at the silo to unload dry fly ash directly into a sealed tank truck for use when the ash is to be sold for reuse. The fly ash handling system is described in greater detail in Section 6.2.4.

Additionally, level alarms are installed on all precipitator hoppers to monitor the fly ash removal system. A high level alarm will allow the operator to take the necessary action to reduce the fly ash level (e.g., unplug the hopper) before the ash level interferes with the operation of the precipitator. Level indication is also provided on the fly ash silo to warn against overfilling.

11.2.4.2 Bottom Ash System Controls

The bottom ash handling system, as described in detail in Section 6.2.6, collects both bottom ash and economizer ash. There are two potential environmental impacts associated with the operation of this system, fugitive dust and wastewater. Both of these are mitigated by the design of the system.

Fugitive dust emissions are controlled by handling the ash in a moist condition. After gravity dewatering, the ash remains in a moist condition containing approximately 15 percent moisture by weight. This minimizes fugitive dust generation during transport vehicle loading operations.

The bottom ash handling system is of the recycle-type design which eliminates routine wastewater discharges. The cooling water remaining after evaporative losses is completely reused in the recirculating bottom ash cooling system design. To ensure that the recirculated water does not become corrosive, and thus need to be discharged, the water will be chemically treated. Water drained from the bottom ash and economizer ash handling system, and from the vehicle loading area is recycled to the bottom ash system. This recycle system limits wastewater flows to the wastewater treatment system to boiler outage periods. During boiler outages, the bottom ash system may require draining to allow maintenance. Drainage will be directed to the wastewater treatment system for treatment prior to discharge.

11.2.5 Wastewater Collection, Treatment, and Disposal Measures

The wastewater generated at New Boston Station during the postconversion period will be collected in sumps throughout the station and pumped to the wastewater treatment and disposal system for treatment, thus reducing impacts to the receiving water quality. Coal pile runoff will be contained in the coal storage area by the coal pile runoff collection system.

The wastewater treatment and disposal system, described in detail in Section 6.2.8, will treat and discharge treated effluent of the quantity and quality described in Section 7.3.2. Treated effluents will comply with all applicable state and federal regulations.

The coal pile runoff ponds will be lined with asphalt, and will discharge to the wastewater treatment system. The potential for leakage from this source is further mitigated by the limited holding time for runoff. The reserve coal pile is surrounded by a collection system to convey runoff to the ponds.

The reserve coal pile will be lined with 6-inch thick soil-bentonite, with a permeability of 10^{-7} cm/sec. The liner extends to the runoff collection system and will be cambered to facilitate drainage and to maintain a positive slope in the event of coal pile settlement. Perforated drain piping system and a 1-foot compacted sand and gravel layer are installed immediately above the liner. Thus, relatively small hydraulic head is anticipated on the liner, no significant leakage is anticipated and, thus, impacts on groundwater quality are effectively mitigated.

11.2.6 Aesthetic Enhancement

Landscaping will be provided to reduce the visual impact of the New Boston Station after conversion. A schematic landscape plan is shown in Figure 11.2-1. Plantings are proposed to be located to help screen the existing and new station structures from nearby residences, recreational users of the Christopher Lee Playground and Independence Square, and traffic along streets in the station vicinity. Viewshed studies indicate the optimum location for screen planting is not on the station property, but along the perimeter of Independence Square, which is bordered by M and N Streets and East Broadway. Most residences bordering Independence Square have visual access to the site from elevations above station grade. Existing tree planting along the streets, as well as along the Square's perimeter, and throughout the Square offer the best screening potential. Proposed landscaping would plant screen trees in the Square to close gaps in the existing rows of trees. The new planting will maintain the scale, character, and visual access to Independence Square in its present state. Abutting views of the station from residential and recreational sites along East First Street at station elevation are partially screened by a concrete, corrugated metal, and brick wall, and to a lesser degree by existing street plantings. High canopy tree plantings along the Christopher Lee Playground fenceline, complementing the existing plantings along East First Street, will provide a visual buffer from these land areas. BECO is willing to undertake the proposed offsite landscaping, assuming that regulatory authorities will permit BECO to recover the invested cost. BECO will, however, require the participation and approval of the City of Boston and the community of South Boston to optimize the proposed landscaping.

Plantings onsite will include trees along New Boston Station's and the Massachusetts Bay Transportation Authority (MBTA) property's southern perimeters, bordering East First Street. These plantings will consist of high canopy trees, which will provide a visual buffer along the existing brick/concrete wall. Proposed plantings on the MBTA property will require permission of MBTA management.

Planting within the station property will also include a grass-covered reserve coal pile. Seeding will establish a vegetative cover, screening the pile to mitigate visual impacts, dust emissions, and erosion. Three coverings were evaluated for the aesthetic treatment of the reserve coal pile: a grass-covered pile, a dome-covered structure, and a cable-stayed structure. Of the three options, the grass-covered pile was selected as the least visually intrusive. Applying a grass covering to coal piles is not a common practice. However, grass coverings have proven successful in improving visual appearance and effective in controlling fugitive dust. The procedural sequence for seeding the reserve coal pile includes the following operations:

1. A mixture of seed and fertilizer with limestone, as needed for pH adjustment, will be applied to the surface of the coal pile by hydroseeder equipment.

2. A several-inch second layer of straw mulch, secured with an asphalt emulsion binder, will be applied over the seed mixture.

3. The mulch/seed layers will receive periodic waterings throughout the summer season to promote and maintain growth. The grass covering will not be mowed.

Proposed plantings include species of upper and lower canopy heights. Trees will be chosen based on screening value, wildlife value, and the ability to tolerate urban-residential environments. Candidates for high canopy trees include: linden (Tilia sp.), red oak (Quercus rubra), pin oak (Q. palustris), London planetree (Platanus acerifolia), sugar maple (Acer saccharum), red maple (A. rubrum), American beech (Fagus grandifolia), European beech (F. sylvatica), mountain ash (Sorbus sp.), and willow (Salix sp.). Candidates for low canopy trees include: dogwood (Cornus sp.), crab apple (Malus sp.), holly (Ilex sp.), and Russian-olive (Elaeagnus angustifolia). Other species may also be selected, based on future consultation with the Boston Parks Department and others.

Proposed aesthetic improvements to New Boston Station's facilities are described and illustrated in Section 7.6. Major improvements under consideration include: demolition of existing structures in certain areas to accommodate new equipment, and demolition of four 250-foot steel stacks. Options also under consideration and illustrated in Section 7.6 are the addition of metal siding to enclose the existing Units 1 and 2 boilers and removal of miscellaneous retired equipment on the retired L Street Station roof. Proposed measures to improve the station's appearance serve to unify the station's visual character and to minimize the station's vertical profile.

11.2.7 Solid Waste Transportation and Disposal Controls

BECO's solid waste management program is discussed in Section 8.2. The plan for coal ash disposal or reuse and the potential impacts associated with alternative modes of transporting coal ash from New Boston Station are identified in Section 8.2. Possible measures to reduce potential impacts for truck, rail, and barge transport modes and for ash disposal are discussed below.

11.2.7.1 Truck Transport

As discussed in Section 8.2.1.4, the potential truck traffic due to ash transport operations at New Boston Station will represent a negligible impact on anticipated base-year (1987) traffic along the designated truck routes in South Boston. In addition, future improvements in roadway access to South Boston, including one or more of the options proposed in the Seaport Access System and Third Harbor Tunnel impact studies, will further reduce the impacts of truck traffic on existing roads in South Boston.

Given the existing and anticipated capacity constraints at a number of major intersections providing access to South Boston under peak-hour traffic conditions, the following measures to minimize the impact of ash transport trucks from New Boston Station will be considered.

1. Whenever possible, truck travel to and from New Boston Station will be scheduled to avoid the peak-hour traffic congestion identified in Section 8.2.1.4.

2. Truck routes will be selected to enable the safest, most expeditious, and shortest access to the regional transportation system by the designated truck routes.

3. Alternatives for improved access to South Boston through road improvement projects will be monitored and employed as they become available.

To minimize the potential impacts on safety, all vehicles will be maintained and operated in accordance with all appropriate state and local regulations. Only the use of those routes designated for truck traffic will be permitted.

Air quality impacts from truck exhaust are negligible, and no mitigation measures are expected to be required. No fugitive dust emissions are expected from ash transport trucks since the ash will be moist and covered, or dry in totally-enclosed tank trucks. In addition, all trucks will be washed prior to leaving the station.

Potential noise impacts from the operation of ash transport trucks at New Boston Station, while assessed as being negligible, will be limited in accordance with the 11-hour (7 am to 6 pm) daytime-only schedule. Ash transport trucks will not operate on Sundays. Vehicles will be equipped and maintained with the required exhaust mufflers. Furthermore, the anticipated truck routes generally avoid sensitive residential areas.

11.2.7.2 Rail Transport

As discussed in Section 8.2.1.4, BECO does not consider it feasible to transport coal ash by rail due to the limited space available onsite for storing and handling rail cars and due to the noise impacts on neighborhoods in the vicinity of the rail line. Partial abatement of noise associated with normal railroad operations may be possible, but is not expected to reduce to an acceptable level the significant impacts of noise from rail operations.

11.2.7.3 Barge Transport

Although the capability will exist for nighttime docking, operation is expected only during daytime hours. Since the impacts of the potential barge transport mode, as identified in Section 8.2.1.4, are negligible, mitigation measures are not expected to be required.

11.2.7.4 Ash Disposal

As discussed in Section 8.2.1, BECO is currently evaluating specific potential disposal sites and ash reuse options. The measure with the single greatest potential for mitigating ash disposal impacts is the reuse of ash as a resource. The strong potential for developing this option is addressed in Appendix F. With ash reuse, the need for disposal is reduced in proportion to the amount of ash reused, thereby reducing disposal impacts.

For ash which must be disposed, disposal plans will be developed in compliance with all applicable state and local regulations and requirements. As such, mitigation measures will be incorporated into the design and operation of the disposal site to minimize impacts. As appropriate to the specifics of the site, these will include measures to minimize fugitive dust generation, to prevent ground and surface water contamination, and to minimize noise, aesthetic, and other environmental impacts.

11.2.8 Fugitive Dust Emission Controls

Potential sources of fugitive dust emissions during the operational phase are limited to coal handling and storage, bottom ash removal, fly ash removal, and solid waste transportation. However, due to the highly efficient control measures to be implemented in all systems, little or no fugitive dust emissions are anticipated. As discussed in Section 11.2.1.3, utilization of state-of-the-art controls in the coal handling and storage system will result in negligible levels of fugitive dust emissions. Fugitive dust emissions from the bottom ash removal system will be minimized by handling the ash in a moist condition (see Section 11.2.4.2). As discussed in Section 11.2.4.1, installation of a pneumatic fly ash removal system in conjunction with a fabric filter at the storage silo vent will remove greater than 99 percent of the fugitive dust generated during fly ash removal from the precipitators to storage. Storage of fly ash in silos will prevent generation of fugitive dust by wind erosion. The transfer of fly ash to trucks will not result in dust generation since the fly ash will be wetted prior to loading or loaded dry into sealed tank trucks. Transport of the solid waste offsite will also not result in dust generation since all ash trucks will be spray washed prior to leaving the plant site, and the wetted load covered with tarpaulins, or dry ash will be loaded directly into enclosed tank-type trucks.

11.2.9 Other Station Noise Controls

Noise mitigation measures will be required for virtually all equipment added during the conversion. This section discusses the noise mitigation for all equipment except the coal handling and storage equipment, which is discussed in Section 11.2.1.2. The acoustical goal is compliance with the City of Boston noise code which establishes noise levels in dBA and in octave bands, as shown in Table 11.2-1, not to be exceeded for daytime and nighttime in residential and industrial zones.

The primary noise sources associated with New Boston Station after the coal conversion are the induced draft (ID) fans and the precipitators. The ID fan broadband and tonal noise propagating out the chimney will be mitigated with reactive/dissipative in-duct silencers located between the ID fans and the chimney. Casing-radiated ID fan noise emissions will be mitigated by enclosing the fans in a large room with silenced ventilation. Duct-radiated ID fan noise will be mitigated with duct lagging possessing acoustical as well as thermal properties. The precipitators will be fitted with acoustical enclosures to mitigate rapper and vibrator noise emissions, as well as noise emissions from pressurized pneumatic fly ash handling equipment. The fly ash and bottom ash handling systems (see Section 6.2) will include conveyors, transfer points, silos, a barge loader, and two dustless unloaders. Mitigation measures for the noise emissions from these lesser sources will include enclosures, motor silencers, and a silencer for the fly ash silo exhaust vent. Other potential noise sources include pulverizers, pulverizer seal air fans and primary air fans, which will be located inside the station. Noise emission from this equipment will be mitigated by the boiler building enclosure. In addition, existing ventilation intakes will be silenced to mitigate potential noise emissions.

By implementing the noise mitigation measures discussed above, the noise emissions from the equipment added during conversion will not increase the overall New Boston Station noise emissions or exceed the City of Boston noise regulations. A discussion of predicted noise levels during station operation is included in Section 7.2.2.

11.2.10 References

Electric Power Research Institute (EPRI). Impact of Cleaned Coal on Power Plant Performance and Reliability. EPRI CS-1400, Project 1030-6. April 1980.

Resource Engineering Incorporated (REI). Influence of Sulfur Content on Coal Availability and Coal Price. December 1982.

U.S. Department of Energy (DOE). Coal Cleaning Review - Cogeneration Feasibility Study. Bartlesville, OK. December 1979.

U.S. Department of Energy (DOE). Monthly Energy Review. August 1982.

U.S. Environmental Protection Agency (EPA). Effect of Physical Coal Cleaning on Sulfur Content and Variability. EPA-600/7-80-107. May 1980.

U.S. Environmental Protection Agency (EPA). Evaluation of Physical/Chemical Coal Cleaning and Flue Gas Desulfurization. EPA-600/7-79-250. November 1979.

TABLE 11.2-1

BOSTON ZONING DISTRICT NOISE STANDARDS

Noise standards for the several zoning districts of the City of Boston, as defined in and established pursuant to the Boston Zoning Code, are as established by the following table.

Octave Band Center Frequency of Measurement (Hz)	Maximum Allowable Octave Band Sound Pressure Levels					
	Residential		Residential - Industrial		Business	Industry
	Daytime	All Other Times	Daytime	All Other Times	Anytime	Anytime
31.5	76	68	79	72	79	83
63	75	67	78	71	78	82
125	69	61	73	65	73	77
250	62	52	68	57	68	73
500	56	46	62	51	62	67
1000	50	40	56	45	56	61
2000	45	33	51	39	51	57
4000	40	28	47	34	47	53
8000	38	26	44	32	44	50
Single-Number-Equivalent (dBA)	60	50	65	55	65	70

SOURCE:

Regulations for the Control of Noise in the City of Boston, 1975.

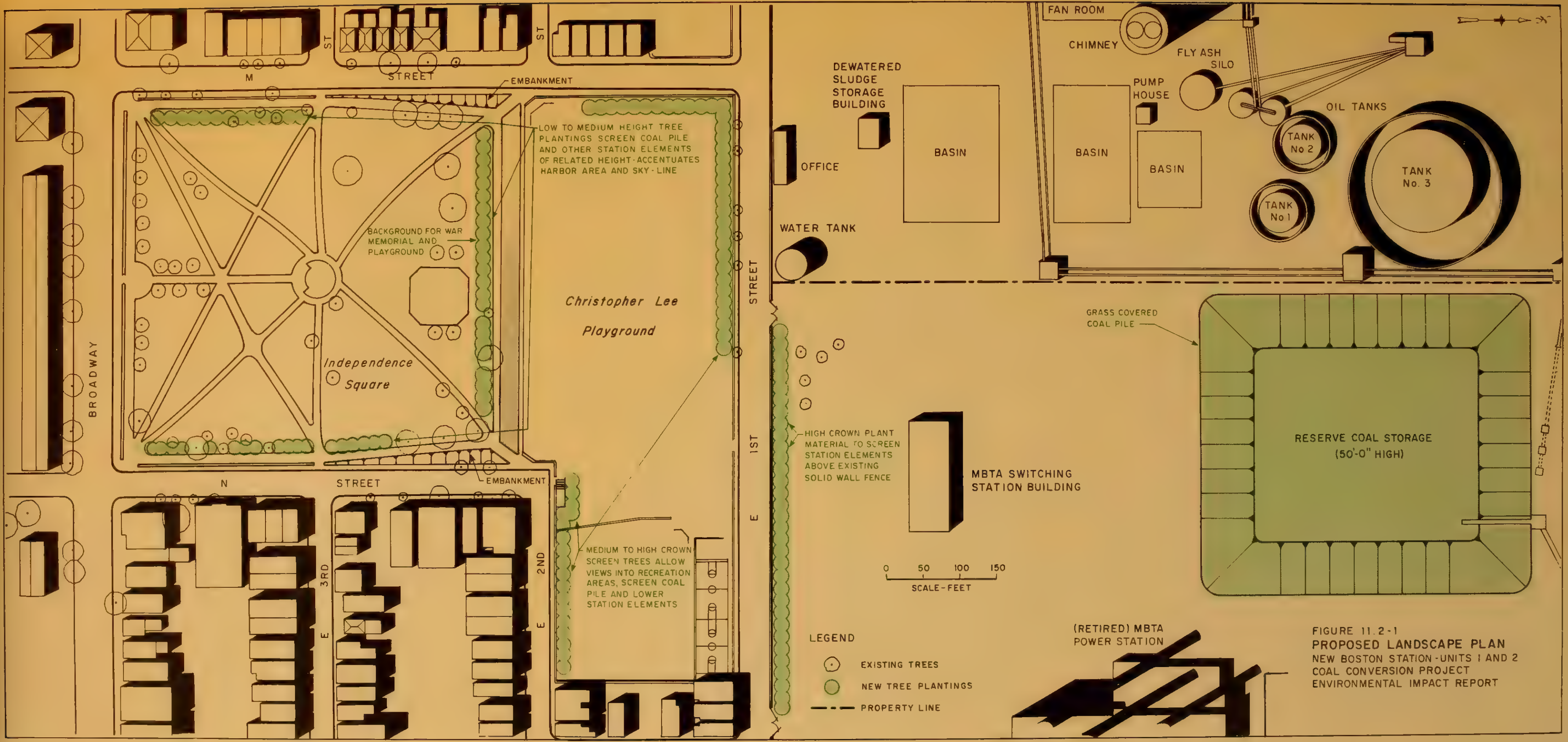


FIGURE 11.2-1
PROPOSED LANDSCAPE PLAN
NEW BOSTON STATION-UNITS 1 AND 2
COAL CONVERSION PROJECT
ENVIRONMENTAL IMPACT REPORT

M STREET
ST
ST
EMBANKMENT
BROADWAY
LOW TO MEDIUM HEIGHT TREE PLANTINGS SCREEN COAL PILE AND OTHER STATION ELEMENTS OF RELATED HEIGHT-ACCENTUATES HARBOR AREA AND SKY-LINE
BACKGROUND FOR WAR MEMORIAL AND PLAYGROUND
Independence Square
Christopher Lee Playground
N STREET
EMBANKMENT
E 3RD
E 2ND
MEDIUM TO HIGH CROWN SCREEN TREES ALLOW VIEWS INTO RECREATION AREAS, SCREEN COAL PILE AND LOWER STATION ELEMENTS
E 1ST STREET
DEWATERED SLUDGE STORAGE BUILDING
OFFICE
WATER TANK
BASIN
BASIN
BASIN
FAN ROOM
CHIMNEY
PUMP HOUSE
FLY ASH SILO
OIL TANKS
TANK No 2
TANK No. 3
TANK No 1
GRASS COVERED COAL PILE
HIGH CROWN PLANT MATERIAL TO SCREEN STATION ELEMENTS ABOVE EXISTING SOLID WALL FENCE
MBTA SWITCHING STATION BUILDING
RESERVE COAL STORAGE (50'-0" HIGH)
0 50 100 150
SCALE-FEET
LEGEND
EXISTING TREES
NEW TREE PLANTINGS
PROPERTY LINE
(RETIRED) MBTA POWER STATION

SECTION 12

AMBIENT AIR QUALITY MONITORING PROGRAMS

12.1 EXISTING AMBIENT AIR QUALITY MONITORING PROGRAMS

Boston Edison Company (BECO) is presently operating a state approved four-station ambient air quality monitoring network in Metropolitan Boston. The existing BECO monitoring program records ambient concentrations related to the current oil-firing configuration at its power generating facilities and approximately 20 other major sources throughout the area. The locations of the monitoring stations are East Boston, Boston (Atlantic Avenue), Dorchester, and Long Island. Pollutants presently monitored are sulfur dioxide (SO_2), total suspended particulates (TSP), and sulfates. Wind speed and direction are also recorded at the Long Island, East Boston, and Dorchester monitoring stations in order to determine the wind characteristics which affect the dispersion patterns.

In addition to the BECO monitoring stations, the Massachusetts Department of Environmental Quality Engineering (DEQE) operates an extensive monitoring network in Metropolitan Boston. The DEQE network presently monitors compliance with ambient air quality standards on a regional scale for SO_2, TSP, nitrogen dioxide (NO_2), carbon monoxide (CO), and ozone. The U.S. Environmental Protection Agency (EPA) presently analyzes TSP samples collected by DEQE at one monitoring station for lead concentrations. Table 5.3-2 lists all monitoring stations in the BECO and DEQE monitoring networks and identifies the pollutants being recorded at each monitoring station. Figure 5.3-1 shows the location of the monitoring stations.

BECO and DEQE samples for TSP and sulfates utilize 24-hour samples taken every sixth day. Ambient concentrations of SO_2, NO_2, CO, and ozone are recorded continuously. All BECO and DEQE air quality monitoring is performed with Reference Methods, in accordance with 40CFR50, or Equivalent Methods, in accordance with 40CFR53 and 40CFR58. The specific methods presently being utilized by BECO and DEQE are as follows:

	Sampling or Monitoring Methods	
Pollutant	BECO	DEQE
TSP	Hi-Volume sampler	Hi-Volume sampler
Sulfates	Hi-Volume sampler	-
Lead	-	Hi-Volume sampler
SO_2	Pulsed fluorescence	Pulsed fluorescence

Pollutant	Sampling or Monitoring Methods BECO	 DEQE
NO_2	-	Chemiluminescence
CO	-	Nondispersive infrared
Ozone	-	Chemiluminescence

The ambient data collected by BECO and DEQE are made available to the public by DEQE on an annual basis in summary form. These data are primarily used by DEQE to determine regional compliance with Massachusetts and National Ambient Air Quality Standards. In addition, these data can be utilized as technical support for the preparation of environmental impact reports, state implementation plan revisions, etc.

12.2 MONITORING PROGRAMS ASSOCIATED WITH THE PROPOSED PROJECT

12.2.1 Ambient Air Quality Monitoring

A comprehensive U.S. Environmental Protection Agency (EPA) and Department of Environmental Quality Engineering (DEQE) approved computer modeling analysis was undertaken to assess the adequacy of the existing ambient air quality monitoring network in determining compliance with federal and state ambient air quality standards after the coal conversion. Results show that changes in predicted ambient concentrations of criteria and noncriteria pollutants expected during coal firing do not warrant relocation or addition of ambient monitors within Metropolitan Boston. As described in Section 7.1.2.3, modeling results indicate that expected net changes in ambient concentrations will be small and often indicate that future local air quality will be improved as compared to existing levels. Since there is no indication that there will be any significant deterioration of air quality due to coal conversion, the existing networks will be utilized for the postconversion. However, as a result of community concerns, after coal conversion Boston Edison Company (BECO) will install an air quality monitoring station, with DEQE approval, in South Boston [monitoring sulfur dioxide (SO_2), total suspended particulates (TSP), and wind speed/wind direction] to measure postoperative ambient air quality.

Four existing monitoring stations are exceptionally well located for the coal configuration and proposed taller chimney at New Boston Station. The monitoring stations locations, the station operators, and the pollutants monitored are as follows:

Location	Station Operator	Pollutants Monitored
Dewar Street, Dorchester	BECO	SO_2,TSP, sulfates
Atlantic Avenue, Boston	BECO	SO_2, TSP, sulfates
Kneeland Street, Boston	DEQE	SO_2, carbon monoxide (CO), ozone
Kenmore Square, Boston	DEQE	SO_2, nitrogen dioxide (NO_2), CO, lead, and TSP

A summary of the instrumentation, data recording and analysis, quality assurance procedures, and data reporting methods specific to these four monitoring stations is provided below.

NEW BOSTON STATION - DEIR

Instrumentation

SO_2 is monitored by BECO with a Thermo-Electron Corporation (TECO) Model 43 pulsed fluorescent analyzer. DEQE also measures SO_2 with a TECO Model 43 instrument. Instrument specifications are shown in Table 12.2-1.

BECO samples TSP and sulfates with Misco Model 650 high-volume samplers with automatic flow controllers. DEQE samples TSP and lead with a General Metals high-volume sampler.

DEQE monitors NO_2 with a Monitor Lab Model 8840 analyzer, ozone with a Monitor Lab Model 8410E instrument, and CO with a Monitor Lab Model 8310 analyzer.

BECO measures wind speed and direction at the Dorchester monitoring station with Met-One Models 014 and 024 wind vanes, with the following specifications:

	Wind Speed	Wind Direction
Model No.	014	024
Threshold	>1 mph	>1 mph
Accuracy	±0.25 mph or 1.5%	±5°
Distant constant	Less than 15 feet	Less than 15 feet
Damping ratio	-	0.25

Data Recording and Analysis

BECO telemeters SO_2, wind speed and wind direction on a continuous basis to BECO's main offices with a Rockwell DL 80 Data Handling System. The monitoring stations contain a back-up system, composed of digital cassette recorders and analog Esterline-Angus recorders.

After the TSP filters are weighed, sulfates are determined from an aliquot of the filter by the Turbidity method of ASTM D516.

Air quality data from the DEQE monitoring stations are presently being converted from onsite recording to a telemetry system. It is anticipated that the new system will be operational by the summer of 1983.

Quality Assurance

Quality assurance at the BECO monitoring stations is in accordance with Appendix B to 40CFR58. The zero and span of the SO_2 analyzers are checked daily with TECO Model 145 permeation tube calibrators. The calibrations of the tubes and flow measuring devices are traceable to the National Bureau of Standards (NBS).

Quality assurance at the DEQE monitoring stations is in accordance with the State and Local Air Monitoring Stations (SLAMS) requirements of Appendix A to 40CFR58. Calibration is also traceable to NBS.

Data Reporting

All BECO SO_2 air quality and meteorological data are reduced to hourly averages. All data are submitted monthly to DEQE in hard and machine readable copy in Storage-and-Retrieval-of-Aerometric-Data (SAROAD) format, and in conformance with state regulatory requirements. Latest 1-hour, 3-hour, and 24-hour averages are telemetered to the DEQE once per hour.

Other Pollutants

Current ambient monitoring at the four stations described in detail, as well as the remainder of the BECO/DEQE networks, includes all pollutants for which emissions associated with the proposed coal conversion are signficant [i.e., SO_2, particulate matter, and nitrogen oxides (NOx)]. The current monitoring program could be expanded to include trace elements through laboratory analysis of TSP filters. However, due to the predicted net improvement or insignificant increase in ambient concentrations of the trace elements, TSP filter analysis is unnecessary.

12.2.2 Emissions Monitoring

The opacity of the emissions during proposed coal burning will be measured with instrumentations in compliance with Appendix B to 40CFR60 and the Commonwealth of Massachusetts requirements. After completion of the proposed coal conversion, particulate emissions will be sampled in accordance with U.S. Environmental Protection Agency (EPA) Method 5, Appendix A to 40CFR60. Compliance with SO_2 emission limitations will be assured through establishment of a coal sampling and analysis program which will determine coal sulfur content. Emissions testing for all other pollutants (e.g., NOx, trace elements) is not required.

TABLE 12.2-1

SPECIFICATIONS OF SO_2 EQUIVALENT METHOD

Specification	Units	EPA Requirement	TECO Model 43
Range	ppm(1)	0-0.5	0-0.5
Noise	ppm	0.005	± 1%
Lower detection limit	ppm	0.01	0.005
Interference equivalent			
•Each interferant	ppm	±0.02	>0.0005
•Total interferant	ppm	0.06	-
Zero drift			
•12 hour	ppm	±0.02	>0.0005/7 days
•24 hour	ppm	±0.02	>0.005/24 hr
Span drift			
•20% of upper range limit	%	±20.0	>3/7 days
•80% of upper range limit	%	±5.0	>1/24 hr
Lag time	minutes	20	10 sec
Rise time	minutes	15	4
Fall time	minutes	15	4
Precision			
•20% of upper range limit	ppm	0.01	0.005
•80% of upper range limit	ppm	0.015	0.005

NOTE:

1. ppm - parts per million by volume.

GLOSSARY

ADT	Ash Disposal Trucks
AFBC	Atmospheric Fluidized Bed Combustion
AQCR	Air Quality Control Region
BACT	Best Available Control Technology
BaP	Benzopyrene
BAT	Best Available Technology Economically Achievable
BATEA	Best Available Treatment Technology Economically Achievable
BCB	Boston City Base
BCC	Boston Conservation Commission
BCT	Best Conventional Pollutant Control Technique
BECO	Boston Edison Company
BGC	Boston Gas Company
BMIP	Boston Marine Industrial Park
BPT	Best Practicable Control Technique Currently Available
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CANSAP	Canadian Network for Sampling Precipitation
$CASO_3$	Calcium Sulfide
$CASO_4$	Calcium Sulfate
CEQ	Council on Environmental Quality
CFBC	Circulating Fluidized Bed Combustion
CMR	Code of Massachusetts Regulations
CO	Carbon Monoxide
COE	U.S. Army Corps of Engineers
CONRAIL	Consolidated Rail Corporation

GLOSSARY (Cont)

CRC	Chemical Rubber Company
Cu	Copper
CWA	Clean Water Act
CWM	Coal/Water Mixture
CZM	Coastal Zone Management
DEQE	Department of Environmental Quality Engineering
DEIR	Draft Environmental Impact Report
DO	Dissolved Oxygen
DOE	Department of Energy
DOI	Department of Interior
DPU	Department of Public Utilities
DPW	Department of Public Works
DWPC	Division of Water Pollution Control
EA	Environmental Assessment
EDIC	Economic Development and Industrial Corporation
EID	Environmental Information Document
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ENF	Environmental Notification Form
EOEA	Executive Office of Environmental Affairs
EOIR	Emission Offset Interpretative Ruling
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
ESECA	Energy Supply and Environmental Coordination Act of 1974
ESP	Electrostatic Precipitators

GLOSSARY (Cont)

FAA	Federal Aviation Administration
FBC	Fluidized Bed Combustion
Fe	Iron
FEIR	Final Environmental Impact Report
FEMA	Federal Emergency Management Agency
FGD	Flue Gas Desulfurization
FONSI	Finding of No Significant Impact
FWPCA	Federal Water Pollution Control Act
FWS	Fish and Wildlife Service
GEP	Good Engineering Practice
Gm	Geometric
GPM	Gallons Per Minute
HCHO	Formaldehyde
HIP	Housing Improvement Program
Hz	Hertz
ID	Induced Draft
ISC	Industrial Source Complex
LCDR	Lieutenant Commander
LNG	Liquified Natural Gas
LOS	Levels of Service
MAP3S	Multistate Atmospheric Power Production Pollution Study
Massport	Massachusetts Port Authority
MATEP	Medical Area Total Energy Plant
MBAPCD	Metropolitan Boston Air Pollution Control District
MBTA	Massachusetts Bay Transportation Authority

GLOSSARY (Cont)

MDC	Metropolitan District Commission
MEPA	Massachusetts Environmental Policy Act
MLW	Mean Low Water
MPN	Mean Probable Number
NAAQS	National Ambient Air Quality Standards
NBS	National Bureau of Standards
NEDS	National Emissions Data System
NEPA	National Environmental Policy Act
NEPEX	New England Power Exchange
NEPOOL	New England Power Pool
NERC	North American Electric Reliability Control
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGVD	National Geodetic Vertical Datum
Ni	Nickel
NOI	Notice of Intent
NOx	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NPDES	National Pollution Discharge Elimination System
NR	Non-attainment Review
NSPS	New Source Performance Standard
NSR	New Source Review
O_3	Ozone
OCA	Oil Conversion Adjustment
OSHA	Occupational Safety and Health Administration
OTA	Office of Technology Assessment

GLOSSARY (Cont)

PAH	Polycyclic Aromatic Hydrocarbon
PAN	Peroxyacetyl Nitrate
Pb	Lead
PB_2N	Peroxybenzoyl Nitrates
PFBC	Pressurized Fluidized Bed Combustion
PM	Particulate Matter
PNA	Programmable Noise Analyzer
POM	Polycyclic Organic Matter
PPIFUA	Power Plant and Industrial Fuel Use Act of 1978
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RCRA	Resource Conservation and Recovery Act
REM	Roentgen Equivalent Man
RPM	Respirable Particulate Matter
SAG	U.S. Navy Surface Action Group
SAROAD	Storage-and-Retrieval-of-Aerometric-Data
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Stations
SO_2	Sulfur Dioxide
SO_4	Sulfate Particulates
SOF	Statement of Findings
TDS	Total Dissolved Solids
TECO	Thermo-Electron Corporation
TLV	Threshold Limit Values
TPH	Tons Per Hour

GLOSSARY (Cont)

TSP	Total Suspended Particulates
TSS	Total Suspended Solids
USDI	United States Department of the Interior
UTM	Universal Transverse Mercator
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
WWTS	Wastewater Treatment System
WQ	Water Quality
Zn	Zinc

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